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Federal highway spending and economic growth in Appalachia

James Herbert Noonan
West Virginia University

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Federal Highway Spending
and Economic Growth in Appalachia

by James Noonan

Thesis submitted to the
College of Arts and Sciences
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F. Carson Mencken, Ph.D., Chair
Ronald Althouse, Ph.D.
Joshua Kim, Ph.D.

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ABSTRACT

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James Herbert Noonan

Appalachia has always struggled economically due to three main factors: absentee ownership, isolation, and stereotyping. In 1965, Congress created the Appalachian Regional Commission with the mission of providing economic development programs to increase development in the region. Federal highway spending was seen as a key to improving the Appalachian infrastructure.

Today, the debate continues on the effectiveness of federal highway spending in Appalachia. The purpose of this study is to examine the effects of federal highway spending on socioeconomic status in Appalachia by analyzing the effects of spending during an economic recovery from 1983-89 and recession 1989-92. Three constructs determine increases in socioeconomic status: per capita income growth, civilian employment growth, and non-farm employment growth.

The data indicates that federal highway spending in Appalachia has little to no effect on increasing socioeconomic status in the region. The most important factor indicating current growth in Appalachia is growth during the previous economic cycle.

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<u>Introduction</u>

Since the colonial days, Appalachia has been known as a wild and wonderful frontier. Timber and coal called forth the early entrepreneurs who desired to fill their coffers and develop new fortunes. However, with the plundering of these resources and riches, poverty took over leaving the area economy in ruins. Henry Shapiro claims that since the 1870s Americans have regarded Appalachia as a strange land inhabited by a peculiar people (1977). Images and stories from early color writers had given Appalachia a legacy where people were depicted as unintelligent and "backwards" or uncivilized. Stereotypes such as these have left negative images and impressions on the region, attempting to justify the lack of assistance from outside sources because people feel Appalachia is a lost cause. While Appalachia thrived during the early years with a booming coal and industrial workforce, the decline in primary sector jobs and increase in service sector jobs have negatively impacted the region's economy (Couto 1994; Maggard 1994). Since the 1960s organized federal spending has been coming to Appalachia for 25 years through the Appalachian Regional Commission (ARC) in the attempt to improve the economy in the area.

The President's Appalachian Regional Commission (PARC) concluded in 1965 that the current situation in Appalachia is largely due to the inaccessibility of the region. Mountains, valleys, wide rivers, and thick forests have been obstacles blocking Appalachia's development for centuries. With the advent of highways, Appalachia finally has an escape from the binds of isolation and underdevelopment. The current debate lingers, questioning whether or not government spending on highways would be better spent in other areas of Appalachian development (Rephann and Isserman 1995).

Despite the well-studied, ever-increasing socioeconomic gap between metropolitan and nonmetropolitan areas during the 1980s, there is still debate about the

effect of federal highway spending on socioeconomic status in Appalachia (Mencken 1997). This study will increase the area of knowledge surrounding the Appalachian economy and the effects federal spending has on highway development and economic development. With a deeper understanding about the effects of improved highway infrastructure on socioeconomic status in Appalachia, federal officials will be better able to allocate funds and projects to maximize the benefits of their efforts. This will be accomplished by examining the Appalachian economy from the years 1983 through 1992.

Problem

The purpose of this study is to examine the effects of federal highway spending on the socioeconomic development of Appalachia from 1983-1992. The main question in the study is whether or not the funds supplied by the federal government for the development and maintenance of highways are effective in producing socioeconomic development in Appalachia.

A key factor in discovering the solution to this problem will be to analyze two time periods in which the socioeconomic development occurred. The time interval will be divided into two sections: from 1983 to 1988, when the country experienced a recovery in the economy, and from 1989 to 1992, when the national economy fell into a recession. These fluctuations in the economy may influence the effectiveness of highways and therefore must be compared to see how the government deals with federal spending in the region during these periods.

The second key factor will be how socioeconomic status will be measured. For the purpose of this status socioeconomic status will be divided into three categories of growth: per capita income growth, civilian employment growth, and non-farm employment growth.

Justification of Research

The importance of this study comes from two different perspectives. First, there is little scholarly literature regarding the effectiveness of government spending in the Appalachian economy. Secondly, this study has much to contribute to policy issues concerning the appropriation of highway funds, the consideration of highway placement, and the need for highway maintenance. Learning what methods or areas of spending actually make Appalachia more financially independent and increase development is crucial in policy-making decisions. Future spending could be influenced by this research, therefore maximizing funding effectiveness and allocation.

This research not only affects Appalachia, but other rural regions in the country. The impacts of highway spending found in Appalachia may also apply in those areas, as well. Using funds most effectively also means that spending can impact more developmental areas by solving economic problems with decreased amounts of money and decreasing waste to ineffective development projects. This freed-up funding can then be used in other areas of development. For instance, if effective funding reduces the cost of building a new interstate highway, then those left over funds can be used to improve rural health care.

For example, there is a current proposal to continue a highway, called Corridor-H, from central West Virginia to Virginia and possibly the Washington D.C. region. The debate is focused on whether highway spending is actually improving the socioeconomic status in these regions connected to Corridor-H or are these areas improving due to an increase in educational, or medical spending. Regression analyses should separate spurious variables from important ones in the study; determining the most important effects on socioeconomic growth and help answer this question.

Appalachian Overview

While there are many definitions dictating the boundaries of Appalachia, this study will use the political definitions of the Appalachian region. According to the ARC, Appalachia consists of 399 counties in 13 states (see Table 1), including 5 independent cities and three regions: Northern, Central, and Southern (Raitz and Ulack 1984).

Table 1
Appalachian Region by Number of Counties and Area

State	Number of Counties	Area (sq. mi.)
Alabama	35	24600
Georgia	35	10804
Kentucky	49	16942
Maryland	3	1546
Mississippi	20	10313
New York	14	11806
Ohio	28	13732
Pennsylvania	52	36626
South Carolina	6	3964
Tennessee	50	19238
Virginia	21	9398
West Virginia	55 (Entire State)	24080

(Raitz and Ulack, 1984)

The Northern subregion includes 143 counties and is described as an old industrial based economy undergoing modernization. Central Appalachia is characterized as the poorest of the subregions with coal as its primary resource. It includes 85 counties from southern West Virginia, extreme western Virginia, and a portion of northern Tennessee.   The 169 counties of the Southern Appalachian subregion have traditionally been agrarian based but are in transition to an urban and industrial economy (Raitz and Ulack 1984; Couto 1994).

Much of the vast popular and scholarly literature about Appalachia contends that deficiencies in mountain culture have contributed to, or at least reinforced, economic backwardness and poverty (Billings and Lewis, 1995). Negative stereotypes

about the "backwardness" of the region can exacerbate many kinds of economic difficulties for any region. Businesses and people leave the stigmatized area to look for opportunities elsewhere. These stigmas also do not encourage business or people from outside the region to enter and participate in Appalachian growth and development (Hinsdale et al, 1995). Second, absentee ownership of the land drastically crippled the economic potential of the region. As much as 72 percent of coalfields and 89 percent of the mineral rights are absentee owned (Mountain Life and Work, 1981). This means that the area's resources are drained and the profits go to places not benefiting Appalachians. According to the Appalachian-Land Ownership Task Force, only one percent of the population owned 53 percent of the surface area in 80 Appalachian counties, and three-fourths of the surface area and four-fifths of the mineral acres are absentee owned (Mountain Life and Work 1981). This leaves Appalachians in a bind economically, since they do not have control over their region and do not benefit from the resources.

From the early days, three main issues can be pinpointed as the backbone behind the weakness in the Appalachian economy: The stereotyping of the region's inhabitants, the remote locality of the land, and the ravaging abuse of absentee ownership. Absentee ownership contributes to a poor economic foundation in Appalachia. Despite the fact absentee owners control the land and minerals, they need Appalachians to work for them to mine coal, log the timber and provide services, like drive coal and lumber trucks. In recent years, much of the economy has shifted from the higher paying primary (industrial) and secondary (manufacturing) sectors to the low paying service sectors (driving buses, waiting tables) in Appalachia (Maggard 1994). Coal miners and lumberjacks are being laidoff, partially because of the depletion of resources and partially because of new technologies that make manual labor obsolete. Workers often digress to take service sector jobs, if they find work at all,

which pay significantly less. Any new career opportunities and job developments occur in the service sector; decreasing the socioeconomic status of an area because of the transition from primary and secondary wages to service sector wages.

Historically, Appalachia has always seemed to be outcast from the rest of America. Isolated by the mountains and poor transportation many people living in Appalachia have needed to be independent and self-sufficient to survive. Farmers tilled the soil and raised cattle on farms that were usually only large enough to serve their families. Coal towns were common place, where people lived their lives in debt to their employers. According to one estimate, over 600 company towns sprang up in southern West Virginia, eastern Tennessee, northern Georgia, and western North Carolina between 1880 and 1930 (Shifflett 1986). Because of these early disadvantages and set backs the Appalachian economy was disadvantaged from the start.

In order to combat the disadvantages the region faces, many policies and programs have been created. The Tennessee Valley Authority and the Appalachian Regional Commission are two of these programs created to increase development in Appalachia. According to Isserman and Rephann (1994) the ARC is affecting Appalachia positively by bringing in and managing federal funding in the region. They compared counties in Appalachia to counties in the surrounding area and concluded that the ARC did have a positive effect, although they did not study to the extent to which or why the ARC was effective.

Many of these factors are contributors to a long-standing idea called the culture of poverty. The concept may be best understood by a quote from Michael Harrington stating that being poor in Appalachia is not just a single aspect of one's life but it is their life; poverty in Appalachia is a separate culture (1963).   This statement is a reflection of victim-blaming ideologies, which are driven by stereotypes, and stigmas, which after decades of use have hindered the development of Appalachia. The victim-blaming

theories claim that those in need are responsible for their own predicament, due to a lack of personal effort or resolve. This is usually because the victims are seen as lazy, incompetent, or satisfied with their current condition. In other words, these people are not intended to be the focus of federally funded programs because the money would only be wasted on those not worth saving. Unfortunately, victim-blaming approaches to social issues often leave those in need with a self-fulfilling prophecy by continuing a horrible cycle of perpetual poverty, poor education, and unemployment. People begin to believe they are sub-standard and because of this fail to seek a better standard of living.

However, despite the stigmas many communities rise above the stereotypes and actively participate in the economic development of their communities. For instance in the book *It Comes From the People*, the people of Ivanhoe, Virginia, a small rural town once considered a dying community organized to revitalize the town and demand participation in its future (Hinsdale et al, 1995). These people rallied to form a powerful organized group that actively sought primary and secondary industries to locate in their community. The circumstances and events occurring in Ivanhoe, Virginia demonstrated that community could lead economic development groups by fighting to improve their own situation shows that ideas like culture of poverty are false. People in Appalachia seem willing to work to improve their situations and do not fit the stereotypes of a culture of poverty.

These issues, absentee ownership, isolation, and stereotyping have long contributed to crippling the region's economy, especially when compared to other regions of the United States. Each of these issues can be divided into their own sub factors of harmful contributors that will be examined in further detail.

Economy of Appalachia

Historically, Appalachia has been poor, disadvantaged, and inaccessible; so significantly that in 1965, the federal government felt the situation called for drastic action and formed the Appalachian Regional Commission (ARC). The ARC was the federal solution in eliminating the problems faced by the region by acting as a facilitator of conventional private development (Whisnant 1980).

In a study done by the Appalachian Regional Commission in 1987, the stark comparisons in economic growth between the US and Appalachia are clearly visible. The reports of this study, written by Salim Kublawi, indicate that in the early 1980's while the rest of the America experienced a growing workforce, the Appalachian region was doing so, but at a drastically slower pace. For example, the ARC reported that the number of jobs in the America increased nearly 10% (9.7 million jobs) while in Appalachia jobs only increased a meager 2% (182,000 jobs) (Kublawi 1987). Just by examining employment, one can see that the region is lacking economically when compared to the rest of America.

Likewise, while America experienced an increase in population, Appalachia, by comparison, failed to grow during these years. As Kublawi indicates, from 1980 to 1985 the US population increased 12.2 million people (5.4%), while the Appalachian population only increased 349,000 people or 1.7% (1987). Not only were few people coming to Appalachia, the increase in jobs was not sufficient to cover their in-migration.

Some Appalachian states even experienced an out migration of the residents decreasing the population further.

However, there is a larger problem when comparing the Appalachian economy to America's: Unemployment. In May 1986, 176 of the 397 counties had unemployment rates 150% of the national average (65 counties of which were twice that of the national average) while only 90 counties had unemployment rates under the national average

(Kublawi 1987). The region's economy has suffered from deindustrialization and the introduction of a new world economy.   In the post-War period, legal changes at the Federal level have completely dismantled old company town and scrip system and innovation, mechanization, and the development of strip mining methods have revolutionized the work process in the central Appalachian coal fields (Matvey 1987). While both a blessing and a curse, the new technologies and change in the coal industry created a more efficient means of extracting coal and therefore required fewer workers to extract the same amounts of coal. In fact, unemployment averaged over 25% in West Virginia coal counties during the mid 1980's (Maggard 1994; Mencken 1997). Economic powerhouses tap foreign resources and labor to the highest potential for maximum profit compounding the increase in unemployment due to cheaper overseas labor costs. Unfortunately, the only place for Appalachian workers was the unemployment line.

With the veritable shutdown of the primary sector, there has been an increase in service sector work (Maggard 1994). Service sector work, however, has drawbacks when compared to primary sector jobs. Service sector employment pays lower wages to workers than the primary sector. Because of the reduced wages, the tax-base from the area decreases dramatically.   This effect hinders the supportive economic base and communities are no longer able to have a growing economy. While it is good that jobs are created in communities, service sector jobs are not as lucrative as manufacturing and industry jobs. The replacement of primary sector jobs with service sector employment work is often inadequate and unsatisfying on both an individual and community level.

While these jobs usually pay low wages the effects of the globalization of manufacturing may have a positive effect on rural areas. Rural sociologists and economic geographers maintain that increases in communication technology (satellites, fiber optics, information-superhighway) could allow producer services to decentralize

from major metro areas (Mencken and Singelmann 1998). This would give Appalachians a compounded advantage with some of the other characteristics of the region like lower taxes, property values, and crime (Mencken and Singelmann 1998; Gasmerier & Howard 1994; Goe 1994). However, Maggard (1994) shows that West Virginia is not able to attract the high quality producer service jobs. And the producer service literature shows a distinct urban bias in producer service job location (Sassen 1994;1991).

The Appalachian Regional Commission

The ARC was created through a Congressional act in 1965 with the purpose of improving the Appalachian economy specifically through regional and community development. The Congressional successor to President Kennedy's Presidential Appalachian Regional Commission (PARC), the ARC was the outcome to the reaction of a dying coal industry (ARC 1975). Congress had a very specific mission in mind for the ARC when it was created in 1965. Concluding that "regionwide development is feasible, desirable, and urgently needed," Congress sought by the Act "to provide public works and economic development programs and the planning and coordination needed to assist in development of the Appalachian region" (Isserman and Rephann 1995). Isserman and Rephann also state that the ARC appropriated funds for highways, hospitals and treatment centers, land conservation and stabilization, mainland restoration, flood control and water resource management, vocational education facilities, and sewage treatment works, combined physical infrastructure, social programs, and regional coordination (1995).

ARC and government funding makes sense when examined in the long term. If the government invests in the Appalachian economy through the ARC, then the government, as well as the inhabitants of the region, will reap the benefits of an improved economy. Since the Appalachian economy is underdeveloped and not self-

sufficient, increased government spending would help to stimulate the economy and socioeconomic status of the people living in these underdeveloped regions.

From its beginning, the ARC had a reputation for getting results accomplished even when other federal agencies would have been tied up by protocol (Bradshaw 1992). The literature is filled of instances and the ARC handled examples where projects that would have taken years to complete, in a quick and effective manner.

From this example, it can be concluded that the people behind the ARC not only took their jobs seriously, but were also determined to aggressively improve the economy and well being of Appalachians. By taking initiative in situations, the ARC gained power despite some severe criticisms from political opponents, and by 1975 had reached "maturity," meaning it had achieved a position where it is functioning at the height of its potential powers and is able to carry out the job for which it was designed (Bradshaw 1992).

After twenty-five years in the works, it has become apparent that the ARC has made marked improvements in the Appalachian region. Much of the literature suggests this is fact. Bradshaw concludes that when comparing conditions between 1960 and 1980, the Appalachian people gained considerable improvement in income, employment opportunity, education, and health provision relative to the rest of the country and that net migration was mainly into the region (1992). Kublawi shows that major improvements had occurred for a number of indicators (Bradshaw 1992, Kublawi 1987). From 1965 to 1980, per capita income in Appalachia had risen from 78 to 82.5 percent of the US average, and most significantly, the proportion of people living in poverty has been halved. Health-care delivery had been improved so that by 1980 it was available within a thirty-minute drive for people in 332 of 397 Appalachian counties. In education there had been a rise in the proportion of residents who had completed at least four years of high school -- from 33 percent in 1960 to 56 percent in

1980.   (Bradshaw 1992, Kublawi 1987)

Despite the fact considerable economic improvement has occurred, there have been many opposing powers and threats to the ARC. A major part of the ARC story is its continuing struggle for institutional survival. Under the initial Act the ARC was to end in 1971. The first real threat came with the election of President Nixon, but ultimately he supported the ARC. President Reagan attempted to close the ARC in each year of his presidency, but the ARC survived (Isserman and Raphann 1995).

As a demonstration of the strong positive influence the ARC is believed to have, the ARC has defended all attacks attempting to eliminate the program using the support of political allies. This along with the positive and overwhelming literature has kept the ARC alive and helping the Appalachian economy for over twenty-five years.

Sociological Theory

There are many theories that help contribute and explain the events occurring in Appalachia. Human ecology theory, which is a macro level deterministic perspective, explains how local communities are affected by change in the global economy. Developed from the classical Durkheim's organic solidarity model where society is looked at as an organism and separate parts of the "organism" function together with other "organs" to produce a self-sustaining and replicating society, human ecology has gained acceptance, academically, in explaining the difference between urban and rural communities (Hawley 1986).

Human ecology is grounded by a few economic assumptions where communities are the basic unit of analysis. These communities are functionally integrated systems where the population draws available resources or sustenance from the local environment through technology and social organization. The more diverse and available resources that are available to a community, the more developed the structure and size of the community may grow. This growth occurs in several ways.

First, carrying capacity refers to the size of place a community has at its disposal for the procurement of resources. The carrying capacity is determined by resource inputs like new industries and technologies, profit and other such resources. As a community's input increases so does its carrying capacity. Increases in technology, especially in communication and transportation, are paramount in reducing the spatial friction between communities. New and improved highways facilitate the flow of goods, resources, and services between communities. In short, good highways reduce friction and increase the flow of goods and resources, increasing the carrying capacity of a system.

Spatial dominance is an important factor to consider when examining human ecology and Appalachia. Spatial dominance occurs when one community produces a good that other communities are dependent upon. For an area to improve economically and grow it must have spatially dominant sustenance functions that hold the foundations of the region's economic base. Appalachia historically has had trouble in this area due to absentee ownership. The region's inhabitants, on a grand scale, do not own the resources in Appalachia to benefit from their use. Without these resources available the cycle of economic growth is stunted and eventually reduces, crippling the existing economy and developmental potential. The profits from Appalachian resources do not accrue to Appalachia.

Human Ecology shows that urban areas are progressive in their economies and rural areas are regressive. The ability for a region to import and export depends upon the accessibility to that area. Poor roads or a lack of roads greatly hinder the economy.

Capital Accumulation as well indicates agriculture and produce are dominated by national and global agricultural firms leaving all of the "mom-and-pop" farms to be consumed by large absentee owned businesses. This effectively wipes out small business that contribute to community level growth and replace them with business

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that do not reinvest in the community.

Isolation characteristics intensely hamper a region trying to keep the pace in a global economy. Compounding the region's problems, roads do not easily connect local communities, and where there are connections, steep hilly terrain and perilous cliffs stand in the way. Highways and intestates are few and far between, making it arduous for industries to locate in the area.

With a weak base for the economy, regional development becomes sluggish and reliant on external influences to become effective. Gingham and Mire (1993) explain there are two dominant schools of thought on regional development. The *development-from-above* school views regional development as essentially emanating from the core and growth centers and trickling out to the periphery and hinterlands. This school views regional development as starting from worldwide demand or critical innovation that filters down to national subnational, urban units and hinterland units. The *development-from-below* school does not necessarily dispute the path of development-from-above but, instead argues for regions to take control of their own institutions to increase the life -style desired in the region. Similar to human ecology theories, development theories are concerned with the use of space and a units link with other units.

These theories can explain how the economy in Appalachia is currently shaped. However, the development-from-below theory offers a solution that could save the Appalachian economy given the proper influence and assistance from the federal government. Since small business has become a recently booming industry in Appalachia, there could be substantial increase in the regional economy if a tailor-made spending strategy targets this phenomenon. With a strong craft based culture, Appalachian communities could create a local spatial dominance with products that are not constructed elsewhere. Eventually these communities could expand their business

to the point of having regional, national, or even international influence and therefore import goods and profits to Appalachia.

Capital Accumulation Perspective

According to O'Connor (1973), private capital accumulation is dependent upon both physical and human capital (see also Castles 1988; Feign 1988; 1984). The accumulation of private capital requires investments in physical infrastructure--including roads, railways, ports, bridges, water/sewer systems, hospitals, etc. A well constructed highway reduces transportation costs, which allows companies to produce goods at lower costs, increase profits, expand business, hire more workers and generate more income/employment growth in the local economy (Rephann and Isserman 1995). In addition, O'Connor (1973) argues that private capital accumulation depends upon mastery of new production processes. Private capital accumulation requires educated/skilled workers and cutting edge materials, products and technology (i.e. Research & Development). State spending investment in both physical and human capital is necessary because the costs of both are too high for private capital to adequately meet the physical and human capital needs of capital accumulation. Entrepreneurs will not risk capital to invest repairing or building roads, highways and bridges. Private corporations cannot assume all of the costs of educating workers and assuming the financial risks of developing new technologies (Feign 1984; O'Connor 1973) and therefore the government could easily help a region by picking up some of these costs.

Capital Accumulation also suggests that manufacturing jobs move to areas where labor is cheap. These areas, which due to the new global economy, have opened up for large corporations to exploit. With the removal of these key jobs from the region the economy is crippled when there are no industries moving in to fill the void.

The Effects of Federal Spending

When discussing the importance of federal spending on an area it is imperative to understand the economic relationship between that region and the government. Unfortunately, Appalachia has become dependent upon the federal government for economic support. However, there are various types of economic support. One is by means of welfare and the other is by direct investment in a region through government contracts (such as defense spending with industry in an area) or creating federal jobs (such as the building of a government complex in an area).

Since Roosevelt's New Deal, welfare policies have directed federal funds into Appalachia. As applied to Appalachia, the New Deal fell into three broad categories: industrial, agricultural, and relief (welfare) (Salstrom 1994). However, Salstrom notes these programs may have actually impeded Appalachia's economic progress since these policies were created on a national scale and actually created some disadvantages, simply by overlooking the specific problems pertaining to Appalachia. These disadvantages were caused by eliminating the ability of Appalachian coal and farmers to compete with their Midwestern and northern counterparts. And, as explained later, an increase of federal spending in an area may actually decrease welfare spending.

More importantly, the federal government has the power to make substantial economic investments and divestment in communities (Mencken and Singelmann 1998). The influence of federal dollars can considerably contribute to the economy of an area. For example, since WWII one-third of all manufacturing jobs created in the high-tech electronics and computer industry sectors have been the direct result of federal defense spending (Mencken and Singelmann 1998).

With much of the defense spending going to the western United States, Appalachia had little to gain from these federal endeavors. As Nash (1985) claims, the federal government spent 40 billion dollars in the western United States during World

War II, creating new jobs in aerospace and electronics manufacturing, and natural resource extraction industries. New jobs in these industries had multiplier effects in manufacturing supply services and retail/personal services, leading to even further population growth and urbanization. The federal investments in the local economies in the western United States during the war established western economies (particularly Los Angeles, San Francisco, and Seattle) as the economic pace setters in the post War period (Mencken and Singelmann 1997).

From this example, one could argue that job growth and development is one of the most powerful methods for the government to increase socioeconomic status in a region. If the government spent funds on job development in Appalachia the benefits would have a wide range of effects. First, federal funding for jobs would increase the number of job opportunities bringing federal jobs and facilities to an area that would initially increase the number of jobs (both for construction and staffing of new facilities). Secondly, primary sector industries would have advantages in placing their companies in the region by receiving funds from government programs. This would effectively increase the number of higher paying primary sector jobs and service sector job in the region, decreasing unemployment and increasing the region's mean income. Communities and counties blessed with these new industries would have the benefit of a higher tax base. A higher tax base could then contribute to better education, and community development (such as parks or community centers) which could further entice industry and employees to come to the area. Third, the effects of these job increases would not only increase the socioeconomic status of a community or county, but also the status of the surrounding community and county's spatial diffusion of economic opportunities and the development from the above perspective.

Much of the literature indicates that as spending increases so does the economy of an area therefore raising the socioeconomic status in a region. One of the influential

ways federal spending boosts the economy is through the creation of highways. Especially in Appalachia where isolation alone dooms certain areas to economic stagnation, funds allocated to the building of roadways drastically increases the economic growth in a region. Studies show that highways are positively related to economic activity (Dalenberg and Partridge 1995).

Dalenberg and Partridge show that as federal spending increases, educational growth is positively influenced (1995). Considering Appalachia's generally lower education levels this finding is extremely important. In 1985, 62% of the adult population in southern Appalachia had not graduated, and only ten percent of those 25 years and older had gone on to college (Keefe, Reck, and Reck 1985). It is probable that the combined increase of federal spending into highways and education would greatly increase growth rates and the economy in Appalachia. Appalachia's lower education levels may be due to the isolation of some areas as well as decreased tax bases which school funds are taken.

Federally funded higher education opens limitless contributions to regional socioeconomic status. Land grant institutions proves access to higher education for many people who might have otherwise missed the opportunity to attend college. These institutions keep local money and people in the region while also bringing in students from other areas thus increasing the capital due to the influx of the student population. This capital is not only a benefit to the institution but for the community and region as a whole. Students rent apartments from local landlords and buy food from local stores and restaurants boosting the economy. Area students may use their education and obtain better jobs and open new business in the region. Students from afar may stay in the region and contribute to the region's job market as well. And as the Human Ecology indicates, these benefits are not exclusive to a small area and cause further economic development.

Improved transportation is another benefit of federal spending. Especially in Appalachia, where mountains and woodlands often create steep and curvy roads, and mountain tops need to be bulldozed for airport runways, federal spending could aid in superior transportation which in turn improves socioeconomic status by increasing the availability of resources.

Federal funds would not only maintain current highways but also create new ones linking once remote areas of Appalachia to the rest of the world. For instance, a proposed interstate (called Corridor H) is currently being considered to link Washington DC with parts of Appalachia. New roads such as Corridor H provide access for new industry (primary, secondary, and service) to quickly move their products, where this access was not available before. New roads also allow small business (for instance, hotels and gas stations) to locate on these strips thus improving the local socioeconomic status by not only creating jobs, but by bringing in outside revenue.

In ecological theory, there is an emphasis on how the built environment affects the competitiveness of local communities (Kasarda and Irwin 1991). Diversity and dominance of sustenance activities are a function of the ecological structure of social systems. Empirically, ecological structure affects the ability of a social system to attract and retain a diversity of jobs in high growth industries (Murdock et al. 1993; Kasarda and Irwin 1991; Singlemann et al. 1993; Mencken 1997). Population density introduces higher costs for land and physical limits on social system expansion. Areas with older infrastructures have higher transportation costs due to poor road conditions and poor access, and less reliable public services-- both of which make the costs of production rise, and make communities less competitive when attempting to attract new industries (see also Suttles 1984). Areas without interstate transportation access, or access to resources and markets in metropolitan areas are at a disadvantage when recruiting new

jobs (Rephann and Isserman 1995).

To further support the fact that federal spending improves an area's economy, research conducted in 1996 showed that increases in the level of government spending results in an endogenous increase in total factor productivity in spite of the fact that the spending itself is entirely wasteful (Devereux, Head, and Lapham 1996). They claim that if the increase in productivity is great enough , a government spending shock may result in simultaneous increases in output, employment, wages, and consumption (1996). Yet, this situation only works when there is an underdeveloped or underproducing industry or manufacturing in an area.

Interestingly, some recent research from neoclassical economics indicates under a unique set of circumstances federal spending would in fact *decrease* the growth rates in an area. Using an endogenous growth model, Michael B. Devereux and David Love claim when government spending is financed with an income tax (or wage income tax) a permanent increase in spending reduces the long run growth rate (1995). They state that government spending may raise growth rates, but only if the spending policy is financed without tax distortions (see also Cronovich 1997).

Aside from this idea there are volumes of research that criticize federal spending. First, the effects of federal spending are criticized as being overstated because of methodological flaws. Many studies are done at the state or national level and do not adequately control for the variety of other location factors which might also affect economic performance (see Morgan and LaPlant 1996). Therefore the positive effects of federal spending may be spurious, once other characteristics of the local economy are controlled. Additionally, Munnell (1992) concedes that the effects of federal spending diminish as geography gets smaller. One reason cited (but untested) is spatial diffusion. In a county or city-level model, diffusion patterns will be more problematic. Economic activity does not stop at politically determined geographical borders. Moreover, as

Land and Deane (1992) show, the inability to correct for this can create biased unstandardized regression coefficients.

Another criticism is that federal spending models are misspecified. Regions do not flourish because of federal funding, but receive federal funding because they are flourishing. Most federal programs require matching funds from state and local governments (Walzer and Deller 1993; Isserman and Rephann 1995). Regions that are doing well should be better able to raise the matching funds necessary. Many argue that federal funds do not enhance the well being of an area because they are used to subsidize local tax breaks (Benton 1992). In this sense, federal spending has no positive effect on an area's well being. Federal capital substitutes for local capital (although Walzer and Deller [1993] find little support for this argument).

Finally, some economists argue that human capital intensive federal spending in high tech and technologically intensive industries has a negative effect on employment growth. According to Cronovich (1997), human capital intensive government spending creates a demand for skilled labor. Any firm that hires high tech workers will pay more for the labor (and assume the production consequences) than they would if no federal money were being spent. If fewer workers are hired because of government induced wage inflation, then less multiplier effects will diffuse through the local economies. Therefore, places with high amounts of human capital intensive federal spending may experience negative economic outcomes (particularly on employment growth), compared to places without such spending.

When the government borrows money to increase spending this produces a stimulus (or "shock," as commonly seen in the literature) that in effect jump-starts the economy (see also Block 1995). The shock increases demand which, in capitalist societies, boosts the economy because people will spend their money on products. This money can then be borrowed by the government and is therefore potentially used twice

(only if other industries do not borrow the money first): once for businesses and once for government spending. However, when money is simply taken from taxes for the purpose of federal spending, that capital is only used once. The tax money that could be used to first increase the economy is only reallocated federal funds. This method has two disadvantages. First, it does not stimulate economic growth and in fact decreases long-term growth. Secondly, when people are paying higher taxes to increase government spenditures, they have less to spend for consumer goods, leisure time decreases, and their standard of living drops.

Yet, the shock situation works when there is an underdeveloped or underproducing industry or manufacturing an area. When areas are experiencing a booming economy then there is no need for the government to borrow money from these businesses. Government interference to stimulate the economy only causes hyperinflation in this case.

It is apparent that federal spending also slows economic growth in short periods of time. In a multinational study on the effects of federal spending, the United States showed negative effects from government expenditures for up to ten years after the spending shocks (Hsieh and Lai 1994). This occurred in several of the countries studied in their analysis. Considering these factors, it is apparent that there are many variables in economic growth regarding federal spending. From Hsieh and Lai's (1994) research they find no statistical evidence indicating an overall positive or negative effect when examining the effects of federal spending on the economy. They claim that government spending has quite differing effects on a region's economy.

Effects of Highway Spending

Terrance Rephann and Andrew Isserman best describe the relationship between highway investment and regional economic growth as a complex one, not easily summarized by appealing to one regional economic theory or another. A reason for the

complexity is that transportation infrastructure has both spatial and economic properties; no single location model can fully anticipate the socioeconomic landscape effects (1994).

The positive effects of federal spending on highway development are well-documented (Munnel 1992; Rephann and Isserman 1994). Everyone agrees that public capital investment can expand the productive capacity of an area, both by increasing resources and by enhancing the productivity of existing resources. A well-constructed highway allows a truck driver to avoid circuitous back roads and to transport goods to market in less time. The reduction in required time means that the producer pays the driver lower wages per delivery and the truck experiences less wear and tear. Hence, public investment in a highway enables private companies to produce their products at lower total cost (Munnel 1992).

Providing federal spending creates well-constructed highways, the improved infrastructure allows for increased accessibility in areas that previously were considered isolated to high wage paying industries and manufacturing facilities. Increasing the ability to move goods from Appalachia to consumers improves the infrastructure and increases the region's overall socioeconomic potential. It is in this way that Rephann and Isserman conclude that federal and state highway programs, including current legislation, have been justified, in part, by the claim that additional freeway mileage will enhance the economic competitiveness of predominantly rural regions (Rephann, and Isserman 1994).

However, Walzer and Deller (1993) argue that the effect of federal aid on spending for infrastructure has been subject to debate for many years. Some studies have indicated that federal aid is stimulative while others report that federal aid substitutes for local resources (Walzer and Deller 1993). However, their studies found that in 1987 federal highway spending had a stimulating effect on local expenditures

and would therefore improve the local economy.

To counter the research stating that government spending on highways will improve socioeconomic status, Ron Cronovich's research claims that the impact of government spending on growth through the mechanism described is likely to be negative and possibly substantial. Current empirical tests of the impact of government spending on growth are misspecified since change in the level of government spending depends on the human capital intensity of government expenditures and these studies fail to control for human capital intensity of these expenditures. Therefore, they fail to find a systematic relationship between the rate of growth and the level of government expenditure (Cronovich 1997).

Hypotheses

Human Ecology emphasizes the impact of the built environmental regional processes, but the connection between the state and the built environment is largely ignored in ecological models (Hooks 1994; Kasarda and Irwin 1991; Mencken and Singlemann 1998; Firsbie and Kasarda 1988). State processes, such as investment in infrastructure or subsidizing the production of a manufacturing plant with procurement contracts, are subsumed as endogenous to market processes. Moreover, Hooks (1994: 767) claims that when state effects are considered, ecological theory views state investments in the built environment as either a by-product of private enterprise, or as a short-term phenomena with little impact (see also Frisbie and Kasarda 1988). The limited attention of federal spending in ecological research largely supports this argument that federal spending has little impact on regional processes (see Kasarda and Irwin 1991; Frisbie and Kasarda 1988).

While this research does not necessarily imply the ARC is wholly responsible for the economic growth and improved well being in Appalachia, the ARC has contributed considerably to these effects. Over $8 billion have been spent on highways in

Appalachia from ARC programs (funded through local, state, federal and ARC money) and over $6 billion on other projects from 1965 to 1992. It is difficult to refute the positive effect of the ARC funds impact on the Appalachian infrastructure when there is an apparent positive relationship between government spending and ARC funding with the improved conditions the region has seen over the last twenty five years. However, human ecologists and neoclassical economists discount the role of federal spending, arguing either for negative or no impact on regional well being.

This study is driven under the assumption that federal highway spending improves the economy and well being of people in underdeveloped regions. It is hypothesized this study will further back this assumption. The study should also improve our understanding of the effects of government highway spending in rural areas and should contribute to creating the solutions in improving the economy in these regions by examining which variables best promote economic growth. This analysis will examine the impact of highway spending on employment and growth in Appalachia while at the same time controlling for key constructs from the human ecology theory.

Dependent Variables

The dependent variables in the analysis are first difference logarithmic growth rates for each business cycle (1983-88; 1989-92) for the following measures: Per capita income, civilian employment , and private non-farm employment (**PCGR8388, PCGR8992, CVGR8388, CVGR8992, NFGR8388, NFGR8992**). The growth in these variables is constructed by taking the log of the variable at time two (1988 or 92) and subtracting it with the log of the variable at time one (1983 or 88 respectively) and noting the difference. These three measures are chosen because of their availability in non-Census years, and because their growth rates are highly correlated with other measures of place well being (such as median family income and percent of families in

poverty) that are not available for non-Census years (Mencken 1997). The variables are also indicative of socioeconomic status and an increase in these three variables would indicate an increase in socioeconomic status. Without income and employment increases it is assumed the economic status in a county will not increase significantly.

Independent Variables

Key constructs will be controlled from the human ecology (population density, condition of infrastructure, interstate and airport in the county) and capital accumulation sociology effects. The percentage of adult population 25 years or older with some education beyond high school (**EDUC80, EDUC90**), percent black population, and population density (**PDEN**) will also be controlled. Concentration of earnings in mining, agriculture and forestry, and manufacturing will also be controlling measures for increases in growth in all models. Manufacturing effects will be observed by two main variables. The first will control for the number of workers employed in private manufacturing (**MAN83, MAN89**) and the second will look at the effects of the amount of compensation paid to manufacturing companies per worker (**MWG**). The variable **PERMAN83** will control for the county's average number of workers employed per establishment. Finally the average salary per worker (**SAL83**) will be controlled in observing the effects of highway spending on socioeconomic status. All of these variables will use the most recent data for each business cycle.

Built environment effects contain two measures of infrastructures in the analysis. First, the percentage of housing stock built before 1939 in 1980 and 1990 (**HOU80, HOUS90**); and second, the percent black living in the county in 1980 and 1990 (**PBK80, BLK90**). In the south, counties with a higher percentage of non-white population have traditionally suffered from low infrastructure investment (new roads, water systems, etc.), and percent black in a county serves as a good proxy measure for infrastructure conditions (see Lyson 1989; Singlemann et al. 1993; Talley and Cotton 1993; Mencken

1997). Therefore, regression models will contain a binary regional variable to test differences on the effects of highway spending on south or non-south counties (**SOUTH**).

The sustenance diversity measure captures the dispersion of private, non-farm employees across seven broadly defined industry sectors: manufacturing, services, FIRE (finance, insurance, and real estate), transportation and other public utilities, wholesale trade, retail trade and construction (Mencken 1997).

Differences are controlled for as to whether or not counties are a metropolitan area (**METRO**). A binary dummy variable is used to indicate whether or not counties have an interstate (**INTS**).

Each regression contains a variable controlling for the difference logarithmic growth rates for each business cycle (1980-82 for the 1983-88 cycle, and 1983-88 for the 1988-92 cycle;) for the following measures: Per capita income (**PCGR8082, PCGR8388**), civilian employment (**CVGR8082, CVGR8388**), and private non-farm employment (**NFGR8082, NFGR8388**). These variables are used on the assumption that the previous cycles' growth in the three areas will have an effect on the growth in the current cycle.

The log of federal highway spending (**ROAD83, ROAD89**) will be used in the models to determine a direct effect on the three areas of growth. According to past research a positive effect is expected from this variable.

Regressions will be run twice for each variable with the second regression containing an interaction effect (**INTRO83, INTROAD**) for the log of mine earnings (**LGMIN**) and the log of federal highway spending since Mencken (Forthcoming) shows that federal spending effects are dependent upon mining concentration in Appalachia. The combining of these variables is to control for the assumption that mine earnings may be based in part to the amount of spending on highways. You cannot remove coal from an area if there are no roads to export the resource. These interaction terms are

used to significantly increase a regression model's goodness of fit or r-square.

Time Line

The study will examine multiple regression analyses based on two periods of time: from 1983-1988 during an economic recovery, and from 1989-1992, during a period of national economic recession.

Data Sources

Data for the federal spending measures come from the Consolidated Federal Funds Report. The data for independent and dependent variables will come from government sources, primarily USA Counties.

Analysis

Per Capita Income Growth

All of the statistical analyses were run using SpaceStat, version 1.80, a software program for the analysis of spatial data, created and written by Luc Anselin.

The first regression describes the effects of the 14 independent variables on the per capita growth for the 1983-88 business cycle. The variables for the model explain over 42 percent (r-square of .4242) of the variation in per capita income growth for the recovery business cycle. SpaceStat multicollinearity diagnostics indicate that the model is properly specified (condition number; 21.3). When the condition number is greater than 30 SpaceStat multicollinearity diagnostics indicate a model is problematic. Tests indicate the model is homoskedastic (significant to the .001 level).

Seven of the independent variables showed significant (.05 or less) effects on per capita growth in 1983-88. Per capita income growth in 1980-82 shows the most influential effect on growth in 1983-88. The regression indicates that for every percent increase in per capita growth in 1980-82, per capita growth in 1983-88 increases 25 percent. Education in 1980 also indicates a strong effect on 1983-88 per capita growth as

each percent increase in education increases per capita income growth 13 percent. Each percent increase in the number of employed workers per manufacturing facility has positive effects on the per capita growth in a county (5.3% increase).

Four of the variables contribute to negative effects in per capita growth. Higher percentages of housing built before 1939 have a negative effect on per capita growth between 1983 and 1988. For every percent increase of housing built before 1939 the per capita income growth decreases seven percent. Each percent increase of percent black in a county also shows a negative effect on per capita income growth during the 1980's recession (11 percent for each percent increase in the Black population). Lastly, for each percent increase in the log of mining earnings per capita growth decreases 1 percent.

The effects of federal highway spending have no significant effect on per capita growth between 1983 and 1988.

When adding the interaction term there is only a slight significant increase in the r-square (from .4242 to .4246) and the same independent variables have significant effects on the dependent variable. Again there are no problems with multicollinearity.

When looking at the effects of federal highway spending on per capita income growth between 1989 to 1992, increasing federal spending has a significant positive effect. Interestingly, of the six significant independent variables in the model only federal spending has a positive effect. However, the amount of variance we are able to explain drops significantly (from .4242 for 1983-88 to .2845 for 1989-92) but we still account for over 28 percent of the variance in per capita growth.

The effect of the previous per capita cycle (1983-88) negatively impacts the 1989-92 cycle. For every percent increase in the 83-88 cycle per capita income decreases 11 percent between 1989 and 1992. Similar to the 1983-88 model, housing built before 1939 negatively influences the dependent variable. However, the effect is more severe since each percent increase in housing built before 1939 decreases per capita growth almost

12 percent. Southern counties also show negative effects decreasing per capita growth of two-and-a-half percent on average. Surprisingly, education shows negative effects for per capita growth in 1989-92. For each percent increase in education in 1990 per capita growth decreases nearly 15 percent. Larger manufacturing facilities also have a negative impact on growth displaying a two percent decrease in growth for each percent increase in the size of a manufacturing company. Highway spending has a slight significant increase in per capita growth increasing growth .04 percent for every percent increase in spending. This slight increase in growth is only significant in this model. The model's multicollinearity condition number is 25.6, well below 30, and indicating the model is properly specified.

Again by introducing the interaction term there is only a slight increase in the model's fit (from .2845 to .2848). Because this is not a significant increase in the model's r-square this model will not be used. All five of the other independent variables retain their negative influences on per capita growth. The multicollinearity diagnostic indicates that the model is properly specified.

Civilian Employment Growth

When looking at civilian employment growth for the 1983-88 business cycle only four independent variables have statistical significance, explaining 25.74% of the variance. The amount of civilian employment growth in the 1980-82 cycle had positive effects on growth for the recessive cycle. For every percent increase in 1980-82 civilian employment growth the 83-88 cycle experienced a 75 percent increase. Education was also a very important factor in impacting growth. For every percent increase of education the log of employment growth increases 90 percent. Larger facilities have a positive influence on growth increasing 19 percent units for every percent unit increase in the facilities.

The log of mine earnings again shows a negative impact on civilian employment

growth. As the log of mine earnings increase the log of civilian employment growth decreases two percent. As expected, increasing the percentage of Blacks in a county decreases the level of civilian employment growth. For every percent increase in the percent Black population the log of growth decreases 23 percent. Surprisingly, no other variables show statistically significant effects on civilian growth.

This model's multicollinearity condition number is 18.25 indicating a proper fit and free from highly correlated independent variables. Similarly the model is homoskedastic.

Adding the interaction term does not significantly increase the r-square (.2574 to .2580) or significantly impact the effects of the five significant independent variables.

The models run for civilian employment growth during the 1989-92 business cycle show similar characteristics to the previous model. The growth cycle is again strongly influenced by the former cycle of growth. Unfortunately, this is a negative effect cause a 38 percent decrease in 1989-92 growth for every percent increase in 83-88 growth. Metro regions have a slight advantage in civilian growth over non-metro regions increasing the log of growth .03 units or three percent.

Percent Black and the log of mining earnings per county again show negative effects on a county's civilian employment growth. For each unit increase growth decreases 21 and .8 percent respectively. While a .8 percent decrease may seem insignificant the t-test for this variable is -3.033 (.003) which confirms that the effect, no matter how slight, does have a significant effect on the dependent variable.

Adding the interaction term causes education to become a significant factor in the analysis. While the model does not show a significant increase of the variables' fit (r-square increases from .2762 to only .2771) each percent increase in the year of education causes a 20 percent increase in civilian employment growth. The addition of the term causes education to become significant (from .058 without the term to .049 with

the interaction). Multicollinearity is not a problem for either model as the condition number for both are well below 30 (17.8 and 17.9 respectively).

Private Nonfarm Employment Growth

Regressions for nonfarm employment growth explain the least amount of variance when compared to the other models. The effect of the independent variables on nonfarm employment growth for the 1983-88 cycle only explains 17.13 percent of the variance. However, the model's F-test (5.67) and multicollinearity condition number (17.16) are indicative of a properly specified model. Heteroskedastic tests also indicate the error terms are constant and therefore are not problematic.

Of the five significant variables in the model, only Metro shows a significant positive influence in non-farming employment growth showing metro regions witnessed a 5 percent increase in growth during this period over non-metro counties.

In contrast to this, four other independent variables show negative effects on non-farming growth. Housing built before 1939 again decreases growth nearly 22 percent for every percent increase of these houses in a county. For each percent increase in the county's Black population decreases non-farming growth 32.5 percent. Mining earnings decrease growth two percent for each percentage increase per county. The variable MWG becomes significant showing that for each percentage increase in manufacturing compensation, nonfarm growth decreases two-tenths of a percent. Again, while this may seem insignificant, the t-test run on the variable shows that some of the variance in non-farming employment growth is determined by this variable.

Introducing the interaction term into this model does not increase the goodness of fit for these variables. The r-square increases only slightly (.1713 to .1716) and the model's multicollinearity condition number remains low (17.22).

The last regressions are for the 1989-92 non-farming employment cycle. For these models the goodness of fit or r-square is the lowest of all the regressions. Both the

regression and the interaction regression have an r-square below .15 (.1422 and .1431 respectively) and have multicollinearity conditions below 18 (17.61 and 17.47) with out any problems concerning heteroskedasticity. However, the introduction of the interaction term does not significantly increase the goodness of fit for the regression and will therefore be ignored.

Five of the independent variables are significant in explaining the variance in non-farming employment for the 1989-92 cycle, four of which have negative effects. The previous non-farming employment cycle for 1983-88 decreases the 89-92 cycle by 21.6 percent for every percent increase. For each percent increase of a county's housing built before 1939 non-farming employment decreases 24 percent. Increases in mine earnings in a county decrease growth .8 percent for every percent increase. And lastly, increasing the number of people who are employed in manufacturing decreases growth .2 percent for every percent increase in the number employed.

Similar to the earlier model metro counties experienced a 4 percent increase in growth over non-metro counties.

Conclusions

The results of the regression models do not support the hypothesis that increases in federal highway spending in a region will increase growth. This study shows the effects of federal highway spending has little direct bearing on an increase in a region's economic growth. In five of the six of the models highway spending failed to yield a significant effect on economic growth during either time period. The one increase in per capita growth during the recession seems uneconomical since an increase in federal spending on highways of one percent would only yield an increase in per capita income of .04 percent. More directly this means that counties which received federal funding for highways showed little significant increase in economic growth than those counties who receive no federal funding. However, the regressions only look at the direct effects

of federal spending on highways increasing growth and not the indirect effects of spending on county infrastructure. The study does control for these other factors and indicates that infrastructure is an important determinant of county level economic growth.

The fact that other infrasturctural variables increase growth causes some confusion and complexity in understanding economic effects in a county. Since highways are key infrastructural components to a region one would expect that increases in highway spending would increase growth. However, there may be other reasons supporting these results. For instance, highway spending may mostly be used to increase the quality of existing roads when creating more roads could have a positive effect. The lack of significance could stem from the idea that federal highway spending in Appalachia may be largely inadequate. Perhaps a further increase in spending would show a significant increase in a region's growth. This study does not support any of these ideas which would need further study and experimentation to explore their importance. The infrastructure of highways is present in Appalachia therefore what is needed are improvements in other factors (such as education) that will help attract jobs.

This fact may be supported by the fact that counties with access to an interstate show no significant increase in any of the regression models. This would support the fact that increasing spending for new highways would not directly produce an increase in economic growth.

Aside from infrastructural effects this study did find that for all time periods and areas of growth the previous cycle of growth significantly impacts economic growth for a region. It appears that increases in the 1980-82 cycle before the 1983-88 economic recovery have significant positive effects on the 83-88 economic cycle. This momentum effect seems to carry the economic growth from one cycle to the next. However, during

the 1989-92 recession county economic growth seems to have the reverse effect. For all 1983-88 cycles there are negative effects in recession growth. This would indicate that the counties, which have positive infrastructural effects on growth, are more harshly impacted by a bad turn in the economy.

These effects are expected when considering the time frame of the study. In a recovery one could expect to see an increase in economic growth, and conversely, a decrease in an economic recession. However, non-farm employment growth is apparently on a decline in Appalachia since all cycles of increasing economic growth show significant decreases on the following cycle.

Education also shows infrastructure influences on economic growth. For three of the six models education shows significant effects on growth cycles. It is apparent that increasing education in an economic recovery has a positive increase on per capita and civilian employment growth. This shows again that increases in the infrastructure do positively impact growth. However, the study also shows that during the 1989-92 recession counties reporting a higher level of education are struck with decreases in growth. This may indicate that regions with blue-collar workers may survive a recession better than those with primarily service sector and professional jobs. This could be a possible indication of the end of deindustrialization in Appalachia because the recession did not further hinder the weakened primary sector showing that the deindustralization has reached equilibrium. More study on these areas would open clues to an area of research that has not yet been explored.

Other infrasturctural indicators do indicate a negative affect on economic growth. As predicted whenever the percent of blacks in a county has a significant effect on growth (in 5 of the 6 models) it is negative. This is supports the theory that the percentage of black in a county serves as a good proxy measure for infrastructure conditions (see Lyson 1989; Singlemann et al. 1993; Talley and Cotton 1993; Mencken

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1997). This data would indicate that southern counties that historically have higher percentages of a black population suffer a slower economic growth than the non-southern regions of Appalachia.

Southern regions only show a significant difference when looking at the per capita growth for 1989-92. During this recession southern counties experienced negative effects on growth. However, it must be noted southern counties would indirectly experience negative effects from a higher percentage of black populations than their non-southern counterparts.

This would also be true of counties with metro regions. Despite, the fact that one would expect metro regions should show increases in growth over their non-metro counterparts their higher percentages of a black population could tend to minimize or negate their overall effects. However, metro regions do have a positive effect and should not be ignored. This could indicate that non-metro counties could use extra support in building infrastructural components (such as roadways) to improve their overall socioeconomic status.

The percentage of housing stock built before 1939 has negative effects on per capita and non-farm employment growth. This is also indicative of counties with poor infrastructural growth again supporting the idea that highway and other forms of infrastructure spending may have indirect effects on a region's socioeconomic status.

Similarly, the number of workers employed in manufacturing has no significant effect on any on the regression models. This is surprising considering the decline in manufacturing and primary sector jobs are being replaced with service sector jobs. These results may indicate that the decline in these jobs for service jobs may not be as detrimental to economic development as once thought. However, this cannot be confirmed through this study alone and would need to be studied further with its own focus. The effects of mine earnings may further support the idea that increasing service

jobs may not be as detrimental to the economy. Since increased mine earnings show negative growth effects for five of the six models one could conclude that coupled with the lack of effect for the number employed in manufacturing changing from primary and secondary sector jobs to service sector work could help bolster economic growth.

Human Ecologist theory is supported by this study. Infrastructure measures show significant effects in both recessions and recoveries. Their main influences are shown through per capita income and private non-farm employment growth. It is apparent that education, housing, and race all play significant roles in growth, all of these are community level variables which fits in with human ecology viewpoints.

Capital Accumulation perspectives are also supported by this study. While this study does not necessarily support the physical aspects of capital accumulation the human capital aspects of the theory are upheld. Interstate and highway spending on the whole were largely insignificant, however, when looking at absentee ownership of the land some significant variables become visible. For instance, an increase in mine earnings always created negative effects on growth. This may be due to the fact that many of these resources are exported to absentee owners and little of these resources are reinvested into the local communities. Therefore, there is no growth, only the preestablished infrastructure.

When totaled these variables tell an interesting story about the effects of highway spending on socioeconomic status in Appalachia. Primarily, it can be said that improving upon highways does not increase economic growth or status. Projects like Corridor-H should be reevaluated in light of the effects of other indicators of growth. Money spent on building highways could perhaps be spent on improving the infrastructure that is already present in Appalachia.

One possible cause for further study would be to explain why these effects for highway spending are insignificant or even negative. Highways may simply move the

growth from one area to another. For instance, small town business, like a gas station, may move from the town to the intersection of the highways. This causes the mom-and-pop stores to close from the competition of bigger companies. The economic growth moves but does not increase. However, this hypothesis needs further study.

The argument for making more highways is also defeated when arguing that increases in highway spending would cause primary and secondary jobs to return to Appalachia. While this may be true increases in these jobs do not necessarily increase growth and therefore are not the solution. Money could possibly be spent on education and retraining allowing workers to be more flexible in the job market.

Understanding what influences socioeconomic growth in Appalachia is key to improving the region. The highway infrastructure is apparently adequate to support the growth in the region, and other development issues in Appalachia are in need of funding.

Table 2. Regression Analysis: The Effects of Federal Highway Spending on Economic Growth in Appalachian Counties 1983-88 (N=399)

	Per Capita Income Growth	Civilian Employment Growth	Priv Nonfarm Emp Growth
	b	b	b
New Urban/Rural Sociology Measures			
Education 1980	.1325**	.9041***	.1782
% Black 1980	-.1123***	-.2373*	-.3252**
Manuf. Compen. '83	-.0007*	-.0020	-.0027**
# Emp. Manuf. '83	-.0000	-.0010	-.0015
Federal Salary 1983	.2900**	.8090***	.17829
Highway Spending '83	.0002	.0000	.0000
Ecological Measures			
Interstate	-.0002	.0220	.0322
Pop Density 1980	-.0000	.0000	-.0001
Metropolitan Co.	.0042	.0025	.0486*
% Housing 1980	-.0713***	-.1193	-.2189**
Other Measures			
Percent in Man. '83	.0533***	.1861**	-.0798
Ern, in Mining 1983	-.0098***	-.0234***	-.0242***
1980-82 Cycle Growth	.2521***	.7516***	-.0255
South Appalachia	.0119	-.0263	.0090
Model Fit/App R. Sq.	0.42***	0.25***	0.17***

*p<.05; **p<.01; ***p<.001

Table 3. Regression Analysis: The Effects of Federal Highway Spending on Economic Growth in Appalachian Counties 1988-92 (N=399)

	Per Capita Income Growth	Civilian Employment Growth	Priv Nonfarm Emp Growth
	b	b	b
New Urban/Rural Sociology Measures			
Education 1990	-.1482***	.1979	.0419
% Black 1990	.0429	-.2171**	-.0589
Manuf. Compen. '89	-.0002	-.0004	-.0025**
# Emp. Manuf. '89	-.0000	-.0010	-.0015
Federal Salary 1989	.0000	.0000	.0000
Highway Spending '89	.0004*	-.0002	-.0006
Ecological Measures			
Interstate	-.0065	.0024	.0046
Pop Density 1990	.0000	.0000	-.0000
Metropolitan Co.	-.0071	.0331*	.0402*
% Housing 1990	-.1164***	-.1320	-.2414**
Other Measures			
Percent in Man. '89	-.0274*	-.0318	-.0440
Ern, in Mining 1989	-.0012	-.0083**	-.0086**
1983-88 Cycle Growth	-.1149**	-.3799***	-.2167***
South Appalachia	-.0267***	.0259	.0140
Model Fit/App R. Sq.	0.28***	0.27***	0.14***

*p<.05; **p<.01; ***p<.001

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