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ABSTRACT: Appalachia is a region that has undergone notable socio-economic change over the last twenty years. This change has produced communities of socio-economic "winners" and "losers." In this paper, I attempt to understand why some communities 'won' and others 'lost' during this period using an analysis informed by two key sociological theories at the opposite end of the structure-agency continuum (new urban sociology, human ecology). The analysis combines shift-share analysis and the Land-Deane two-stage least squares technique for spatial effects to predict earnings change related to local industry mix and county effects for the following business cycles: 1980-82 recession, 1983-88 recovery, 1989-92 recession The analysis shows that measures from both theoretical perspectives are important, but neither dominates (unlike in previous analyses). Implications for current/future theory and research are discussed.

Local economic change has three sources: a) national aggregate change, b) change attributed to local industry effect (industrial structure), and c) change attributed to regional characteristics, or local competitive factors (Kasarda and Irwin 1991: 736). Drawing from two major sociological perspectives at opposite ends of the structure-agency continuum (human ecology, new urban sociology), this paper investigates what makes local industry structures and communities in Appalachia competitive during national business cycles. Appalachia is a region that has experienced considerable socio-economic change over the last three decades, producing communities of economic 'winners' and 'losers' (see Couto 1994; Isserman 1995; Maggard 1994; Mencken Forthcoming). In this paper, I attempt to explain why some counties in Appalachia have faster or slower growing industry structures. In addition, I attempt to explain why some counties have industry structures that are growing faster than the national growth rates for those industries (what Kasarda and Irwin call production location change or competitive effects). Empirically, I investigate the effects of theoretically important community characteristics (e.g. education level of labor force, degree of urbanization, age of infrastructure) on local earnings change that can be attributed to local industry structure, and that which can be attributed to local competitive effects using shift-share analysis and two-stage least squares spatial analysis.

Human Ecology

Human ecology theory maintains that local ecosystem growth is achieved through spatial dominance of primary sustenance functions and diversity of sustenance activities (Poston 1984; Hawley 1986; Irwin and Kasarda 1991; Murdock et al. 1993). Spatial dominance is defined as the extent to which other ecosystems are dependent upon a given community for resources that are necessary for sustenance production. Those communities which have dominant sustenance functions in a spatially linked system of sustenance activities receive greater resource inputs. A base assumption of the human ecology theory is that new resources increase the complexity of an ecosystem, and as more resources are introduced into an ecosystem, the need for coordination and integration functions (i.e. jobs) increases (Poston 1984; Hawley 1986; Kasarda and Irwin 1991).

Sustenance diversity (or diversity of industry structure) is also an important component of ecological models (Albrect and Murdock 1984; Murdock et al. 1993). Social systems with more diverse industry structures perform better during economic cycles than social systems which are over-concentrated in a few industry sectors (Frisbie and Poston; 1976; 1978; Poston 1984; Murdock et al. 1993; Singelmann et al. 1993; Albrect and Murdock 1984). Mencken (Forthcoming) shows that communities with more diverse industry structures also have higher levels of socio-economic well-being (less poverty, higher median and per capita incomes). With a more diverse industry structure, the shock of an economic downturn is not concentrated in one sector, and the negative effects of a downturn in one sector on aggregate levels of well-being are mediated by employment stability in other sectors. In addition, differentiation in sustenance activities implies a greater division of labor, a more efficient use of labor, and greater productivity (Frisbie

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and Poston 1976). On an empirical level, greater productivity leads to higher wages and increased standards of living.

Kasarda and Irwin (1991: 734) argue that in addition to the diversity of local industry structure, the spatial context of that industry structure in a global economy is also important. During recessions the demand for consumer goods declines, as consumers have less discretionary income to spend on goods. Therefore, according to Kasarda and Irwin (1991), those areas which are overconcentrated in consumer goods manufacturing will suffer more during business cycle downturns. In addition, locales which have less spatially dominant industries (i.e. those that face formidable foreign competition such as textiles, steel) will experience economic hardships during recessions, and may not recover fully during recoveries. However, communities with a mix of new high growth and spatially dominant industries will benefit during business cycle upturns, and be better insulated during recessions.

Competitive Effects and Industry Mix

Closely linked to issues of sustenance diversity and function are those factors which give local communities advantages (or disadvantages) when attempting to attract new industries. From an ecological perspective, competitive effects refer to those characteristics of a social system that affect transportation, communication and expansion-- such as age and condition of infrastructure, population density, and spatial linkages to other social systems. Extending Kasarda and Irwin's (1991) model, local competitive effects are important for attracting the new high growth and spatially dominant industries which insulate local communities during business cycle downturns.

Empirically, there are a number of competitive effects that are important for social system expansion (Kasarda and Irwin 1991). 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 (Irwin and Kasarda 1991; Suttles 1984). Areas without interstate transportation access are at a disadvantage when recruiting new industries. In addition, areas with older infrastructures are at a disadvantage when attempting to attract producer and business service jobs, which rely upon state-of-the-art telecommunications fiber optics hardware (Glasmeier and Howland 1994). Attracting producer service jobs is an important issue, these industries provide coordination and integration functions which make other local industries (particularly manufacturing) more competitive in a global context (Goe 1994).

Another important competitive effect, especially for nonmetro economies, is spatial access to a metropolitan area. Communities closer to metropolitan areas have greater access to needed resources and markets (Kasarda and Irwin 1991). In addition, spatial proximity to a metropolitan area creates employment opportunities for commuters, and relocation opportunities for firms seeking to leave congested areas. Social systems adjacent to metropolitan areas are potential targets for metro social system expansion. Therefore, nonmetro areas adjacent to metro areas should have higher levels of well-being.

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Metro areas proximate to other metro areas potentially can make spatial linkages between the areas, thus forming agglomeration economies.

Change Through Competitive Effects

Local competitive effects can also allow areas to experience economic expansion, net of the effects of industry structure mix (Kasarda and Irwin 1991). Local industries can grow faster than the national average for that industry. This local competitive effect can be conceptualized as an internal shift in industrial location. Nationally, the industry may not be growing (even declining), but locally employment may be growing relative to the national average (especially if declining industries are shifting geographic location). It is these local competitive effects that are a point of contention for various theoretical perspectives. Local economic growth is not attributable exclusively to the industrial mix of a locale. Some areas experience economic growth despite having an unfavorable industrial mix (overconcentrated in industries that are not growing). Kasarda and Irwin provide Gwinette County in Georgia as an example. This area experienced tremendous growth during the 1980s, despite having an unfavorable industry mix. What is it about Gwinette County, GA (and similar counties) that allowed it to experience job growth despite having a poor industry mix?

Kasarda and Irwin (1991) argue that it is the spatial-structural attributes of a local community that comprise these local competitive effects. Increases in communication and transportation technology have reduced the need to centralize information and goods production processes. These activities can be moved to less central locations, while still maintaining the same level of functional interdependence among units. For example, a company can move part of its production process from a congested area (like Atlanta, GA) to a less congested area (such as Gwinette Co, GA) without the functional integration of the social system being compromised.

Additionally, increases in communication and transportation technologies allow the populations of dense, congested areas to decentralize and commute from adjacent or remote areas (see Johnson 1993). Therefore, communities surrounding congested areas may experience economic growth through spatial linkages with other regions, despite having an overall unfavorable industry mix.

New Urban Sociology

The new urban sociology is a conflict oriented theoretical perspective on the action end of the structure-action continuum. Where human ecology views systems of spatial dominance resulting from technological innovations and functional imperatives of market adaptations, the new urban sociology contends that they are the product of social groups pursuing interests (Smith 1995; Gottdiener and Feagin 1988). The new urban sociology is interested in how political economic systems work, how groups acquire and monopolize power, who gains and who loses.

The new urban sociology is based on several key assumptions (Smith 1995: 440-1; Gottdiener and Feagin 1988: 172-74). One, society is characterized by antagonistic social relationships (i.e. conflict between competing groups). Two, where human ecologists see change originating from outside of the

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social system, this perspective maintain that social change can originate through internal power struggles and conflict, or from outside sources. Three, there is a world system of capitalist competition, where locally based actors attempt to outbid one another for access to capital, resources and labor. Four, capital is fluid, easily moved from locale to locale-- but places are fixed, and non-transportable. Five, actors in multinational corporations (MNC) move capital in order to maximize profits, with little concern for the communities in which they are investing or divesting. Six, the state plays a very important role in affecting the flow of capital. Government policies at all levels affect the 'business climate' of locales, which encourage and discourage capital investment. Local elites work in conjunction with the local, state and federal government to shape the direction of economic development in a particular locale.

According to the new urban sociology, the ability to attract high growth industries results from a pro-business climate that is forged through an alliance of state and local government and the local business elites. The alliance creates an environment that keeps profits high, taxes and wages low.[1] Therefore, locales which can create a pro-business climate can attract growth industries, which will give the local industry structure a greater position of dominance, creating more economic growth in the local community (Hirschl et al., 1989).

However, business climate in a post-industrial economy does not necessarily mean low-wages and anti-union sentiments. In a post-industrial society, employers are searching for skilled workers, and communities with better educated workers will attract a greater share of capital intensive industries, and consequently experience more growth (Singelmann et al. 1993; Kasarda and Irwin 1991).

Political alliances between local business/political elites and national political power-elite can affect the industry mix of a local community. The federal government makes certain locales competitive through direct investments in high growth industries (particularly military/defense and research/development). Proponents of the state disparity hypothesis from the new urban sociology contend that federal funding policies create spatial variation in economic performance. From the end of World War II through the 1970s, federal spending has favored large cities at the expense of nonmetro areas (Castells, 1988; Markusen, 1987). During this time period, defense spending accounted for a substantial proportion of this disparity. According to Mollenkopf (1983), 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.[2]

Falk and Lyson (1993) contend that the socio-economic spatial disparities in the 1980s were created partly by the transfer of dollars from successful nonmetro development programs to defense

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[1] For example, Falk and Lyson (1988) report that segments of the local business community in Greenville, SC lobbied to block the location of a Mazda automobile manufacturing plant in the area because Mazda intended to pay union wages. High wages would have increased the prevailing market wages in the local labor market.

[2] Los Angeles (CA) county alone received 13.8 billion dollars in defense prime contracts in 1984 (Markusen, 1994).

contracts (see also Castells, 1988; Markusen, 1994). During the 1980s, the Reagan Administration cut over 8 billion dollars from rural development programs, such as FMHA business loans, Economic Development Administration, Community Development Block grants, and over 6 billion in General Revenue Sharing (see Falk and Lyson, 1993: 268). The funding cuts to these programs and the reallocation of these dollars to defense contractors negatively impacted nonmetro economies while creating job growth in the suburbs of large cities. In addition to the financial strains created by cuts to rural development programs, Lyson (1989) argues that the funding cuts also removed important federal leadership from such programs.

Federal employment can give local communities a competitive advantage during business cycles. Mollenkopf (1983) argues that federal spending has several positive effects on the performance of local economies. First, the federal government creates market demand for certain goods, especially defense industry products. Second, the Federal government directly or indirectly employs a significant proportion of the civilian labor force. Civilian layoffs during business cycle downturns are less prominent in the public sector, since the demand for government services generally increases during periods of economic strife (unemployment benefits, welfare entitlement, job training, etc). Therefore, areas with a greater concentration of federal employment may perform better during business cycle downturns because of more stable labor markets.

The federal government also serves as a "banker" for local governments and non-profit agencies. Federal dollars indirectly employ individuals in local, state, and non-profit agencies in areas such as education, research, social services, health and housing. Federal spending stabilizes employment in areas where this funding is concentrated, which translates into consistent consumption of goods and services and a stable tax base. Local stability, bolstered by federal spending, creates a situation where investment in competitive factors (infrastructure and schools) is more feasible, and this gives certain areas a competitive advantage.

Summary

The human ecology perspective maintains that growth attributed to local industry mix is a function of ecological structure. Communities with less density, better infrastructure and those that are spatially linked to other communities are more apt to attract the new high growth industries. This favorable mix of new industries will, in turn, produce growth for the local economy. Net of the industry structure effects, local ecological structure can help generate economic growth, even in communities with an unfavorable industry mix. Communication and transportation technologies and infrastructures make expansion from densely populated areas into adjacent communities attractive, even for nationally declining industries. Thus areas like Gwinette CO, Georgia may attract jobs and people, despite having an industry structure over concentrated in agriculture and retail services.

According to the new urban sociology, a competitive industry mix is the product of business climate and state-disparity. Alliances between government and local business elites can create an environment of low wages/taxes, and high profits. This makes certain locales more attractive than others for investment. In

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addition, an educated workforce can help attract high growth industries. Net of the effects of industry mix, business climate and state disparity can also allow an area to experience growth during bad economic times. Business alliances can create an environment to attract new industries during recessions. Communities can offer lucrative land and tax deals, along with subsidizing moving and building expenses in order to lure industries that are being negatively affected during economic downturns. In addition, the state can invest in an area through grants and contracts. Areas with a greater proportion of government employees may also perform better during business cycle downturns, because earnings in the public sector are more stable during economic downturns.

Appalachia

The purpose of this paper is to test the assumptions of the new urban sociology and the human ecology in an analysis of Appalachian communities during business cycles over the past 20 years. Appalachia is a region that covers 13 states and 399 counties (see Map 1). Appalachia makes for an interesting case study because it is a region which has experienced major industrial transformations over the last 25 years, clearly producing communities that are 'winners' and 'losers' in this process (Couto 1994; Isserman 1995; Maggard 1994; Mencken 1996; Mencken Forthcoming). In addition, the social problems in Appalachia have captured the attention of the federal government over the last 30 years. It is a region that has a federal agency (Appalachian Regional Commission) dedicated to understanding and directing policy to alleviate its social problems. Given the centrality of state disparity in the new urban sociology, this makes Appalachia a particularly interesting case study.

---Map 1---

Analysis

There are clearly defined business cycles over the last 20 year: A recovery from 1976-1979, a recession from 1980-82, a recovery from 1983-88, and a recession from 1989-92 (see Singelmann et al. 1993). I combine two-stage least squares regression analysis with shift-share analysis to test which characteristics of local communities in Appalachia had the most important effect on economic change attributable to industry mix, and to local competitive effects during these business cycles. Counties are the unit of analysis in this study. There are 399 counties in Appalachia (see Map 1).[3] The data from the analysis come from several county-level data sources: Census of Housing and Population, County-City Data Book, County-Statistics File 4; Regional Economic Information System.

Dependent Variables

Conceptually, the dependent variable in this analysis is economic change during defined business cycles. Empirically, we measure economic change by calculating earnings change in a county that is due to : a) national growth rate, b) local industry mix (average growth rate across all industries in county minus

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[3] There are 5 ARC independent cities in Virginia, which we combined with the county in which these independent cities are located.

national growth rate across all industries), c) local competitive effects (sum of growth rate in each industry in the county minus national growth rate for those industries). Conceptually, the human ecology and new urban sociology are theories of economic change, primarily employment change. However, extending these theories to explain earnings change should not be problematic. According to Bartik (1993), areas that experience a 10% increase in employment growth also experience a 4% increase in wages, and the increase in wages is even higher for low-income workers. In addition, change in earnings is conceptually more important than change in employment. Change in earnings is a better indicator of place well-being. Conceptually, areas can experience employment growth without experiencing earnings growth (i.e. area grows poor paying jobs). Industries used in analysis are in the Appendix.

Independent Variables

The independent variables are derived from the human ecology and the new urban sociology. Many of these variables are taken from Kasarda and Irwin's (1991) analysis. From human ecology, there are several key indicators of ecological structure: Population density, metropolitan status (binary variable-1=yes), adjacent to metropolitan area (1=yes). I also include measures of infrastructure age/condition. First, percent of housing stock built before 1939 is a measure of age of infrastructure. It is a proxy variable for age of water and sewer systems, roads and telecommunication hardware. Second, we include percent of county population that is black as an ecological measure of infrastructure condition. Areas with a higher percentage black typically have poorer infrastructures.[4] Whether or not the county has an interstate highway in it is also included as a binary variable (1=yes).

From the new urban sociology, I include several measures of business climate: a proxy measures of labor force quality (percentage of adult population 25 years or older with some education beyond high school), whether or not the county is in a right-to-work state (binary variable- 1=yes), average earnings among manufacturing employees. I also include two measures of federal disparity: total per capita federal spending in the county (less transfer payments), and proportion of the labor force employed by the federal government.

The analysis also controls for the effects of mining dependence with a variable that controls for the total earnings from mining employment. Mining is controlled for because growth in mining earnings were drastically different than national growth rates during several of the previous business cycles. The cyclical nature of oil prices caused drastic fluctuations in the demand for coal. Mining-dependent regions in Appalachia experienced employment losses in the mid/late 1980s, after the price of crude oil declined to under $20.00 a barrel, creating less demand for coal (Couto 1994). In addition, the implementation of newer technologies led to the displacement of a significant proportion of the workforce (Maggard 1994).

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[4] 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 Talley and Cotton 1993; Singelmann et al. 1993; Lyson 1989).

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Agriculture and forestry had significantly different growth rates as well (see Couto 1994). Many agricultural goods are inelastic goods, thus the demand for such goods does not change dramatically during economic downturns.

Predictor variables are measured at or near the beginning of the respective business cycles. For example, to predict the earnings change due to industry mix and local competitive factors between 1980 and 1982, the independent variables are measured in 1979 and 1980. For the earnings change between 1989-1992, the variables are measured in 1989-90.[5] For the 1983-88 model, some measures from 1980 must be used (education, population measures, etc) to predict earnings change. These variables are not available for non-Census years (such as 1983).

Lag and Spatial Effect

The analysis also includes lag terms and a spatial effects term. For the 1980-82 model, previous effects of industry mix and local competitive effects are included as predictors (these are computed from a shift-share analysis of earnings change between 1976-79). For the 1983-88 model, the industry mix and local competitive effects measures from the 1980-82 model are used as lag effect variables. For the 1989-92 model, the 1983-88 effect terms are used as lag predictors.

Given that counties are the unit of analysis in this paper, the analysis is corrected for spatial effects (spatial autocorrelation) using a procedure outlined by Land and Deane (1992). In a first stage equation, a population potential variable is regressed on exogenous and instrumental variables.[6] In the second stage, the predicted values of the population potential variable from the first stage are used with the independent variables to predict the earnings change attributable to local industry mix and county competitive effects.[7] It is important to control for spatial effects when counties are the unit of analysis. Counties are arbitrary political units. Local economies often transcend geographic borders (see Killian and Tolbert 1993; Singelmann et al. 1993). People may live in one county, and commute to work in another. Given the arbitrariness of the dependent variable, it is important to control for the effects of spatial proximity. Local economies transcend county borders. The change attributed to industry mix for County A will not be independent of the industry mix in County B, if A and B are functionally interdependent (i.e. the local economy transcends these two counties). The Land-Deane technique is designed to discount the relative influence of nearby patterns. This helps to discount spatial processes that may operate across arbitrary spatial units.

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[5] Some measures of ecological structure are measured only during Census years (1980, 1990).

[6] Instrumental variables include state dummy variables and population size.

7 The population potential variables express a county's potential industry mix earnings growth rate and competitive effect growth rate as inversely proportional distance functions of the same factors elsewhere (distances are measured with county latitude and longitude centroid coordinates).

Shift-Share Results Maps 2--7 show the distribution of industry mix and local competitive effects among Appalachian counties during the last 3 business cycles. The maps for industry mix show that very few counties in Appalachia have industry mixes that are growing faster than the national earnings growth rate for any of the business cycles. The distribution during the recessions reflect the importance of coal production in the region. Most of the counties that are experiencing positive growth during these periods are coal counties (see below for explanation). The analysis shows that considerably more counties experienced positive earnings growth due to local competitive effects during all three time periods. Many counties in Appalachia had industries where earnings are growing faster locally compared to the national growth rate for those industries. What I hope to accomplish with this analysis is an explanation as to what explains why certain communities have these industries, and others do not.

---Maps 2-7 about here---

Industry Mix Results

The two-stage least squares results for industry mix are presented in tables 1, 2 and 3. The results for the 1980-82 recession show that none of the human ecology variables explain why counties have high or low growth industries in Appalachia. Theoretically, variation in community structure should help explain earnings variation related to industry structure. Among the new urban sociology measures, manufacturing wages and education both have significant effects. Per worker earnings in manufacturing has an inverse effect on the contributions of local industry mix to earnings change during this recession. The average earnings of manufacturing workers is supposed to capture the effects of higher wage labor markets, which represent a disincentive for employers to locate jobs. This analysis shows that places in Appalachia where manufacturing workers have higher earnings had slower growing industries, compared to the national growth rate, during the 1980-2 recession. The implications are that communities with higher waged workers make less attractive places to locate high growth industries. Net of these effects, however, the education level of the community has a positive effect on the earnings change attributed to industry mix. According to the new urban sociology, a well-educated workforce is a competitive factor in a post-industrial economy. It helps areas attract new high-tech, skill-intensive high growth businesses.

--tables 1, 2, 3 about here--

The analysis controls for several factors that are important to mention. First, a lag term is included that captures the change in earnings related to industry mix for the previous business cycle (1976-79). Second, the Land-Deane spatial effects term is not significant in this equation. This would suggest that spatial autocorrelation is not a major problem in this analysis. Substantively, counties in Appalachia appear to be relatively autonomous units of analysis in this business cycle. This is an interesting finding, given that Kasarda and Irwin (1991) show that spatial effects are important for a national sample in this business cycle. These results may show the lack of functional inter-dependence among Appalachian counties.

The control variable for mining dependence is significant. Areas with a greater proportion of earnings in mining had industry mixes that had greater positive growth rates during the 1980-2 recession.

This is an important variable to control for, because of the energy crises that the U.S. faced at the end of the 1970s. The demand for domestic coal increased dramatically, as future oil supplies became less certain. Therefore communities that were more mining dependent experienced growth due to the increase demand for domestically produced coal.

The results for the 1983-88 recovery are presented in Table 2. The analysis shows that percent of the county population black (a proxy measure for infrastructure) is the only human ecology variable that is significant. Areas with a higher percentage black have problems attracting high growth industries. From an ecological perspective, percent black represents areas with neglected infrastructures, which makes local communities less competitive at attracting high growth industries.

From the new urban sociology, average earnings per manufacturing employee, education and right-to-work status all have significant effects. Manufacturing earnings have a negative effect on the earnings attributed to industry mix in the 1983-88 recovery. Areas with high manufacturing wages are less likely to attract high growth industries.

Right-to-work status also has a negative effect on earnings change related to industry mix. This is unexpected. Right-to-work status is an anti-union, business climate measure, and should help attract industries and make locales more competitive. What this analysis suggests is that right-to-work laws help to attract industries that have slower growth, perhaps declining industries in the product cycle (advanced manufacturing), which are looking for short-term profits through downsizing labor costs. The policy implications of these results are that passing right-to-work laws (proposed in many non-RTW states) would not be helpful in creating a long-term state of well-being. The existence of these laws in some Appalachian states did not help local communities attract competitive high growth industries.

Education has a positive effect. Areas with a more educated workforce have more competitive industry mixes. Educated workers can be a 'draw' factor the attracts new, high growth industries. The effects of education also increase dramatically during the recovery, when the unstandardized effects of education are compared for the two business cycles (1980-2 b=.095, 1983-8 b=.754).

Earnings related to mining has a negative effect on the industry mix effect. This is expected because oil prices fell dramatically during the mid-1980s, causing a sudden, dramatic drop in the demand for coal (Couto 1994; Mencken Forthcoming). Therefore, areas over-dependent upon coal in the mid 1980s had significantly lower earnings growth, compared to other areas. Net of these effects, percent of earnings in forestry/agriculture have a positive effect on local industry mix. Demand for wood products increased during recoveries, especially if new home construction grows during this period.

The results for the 1989-92 recession are presented in table 3. Three human ecology measures have significant effects: population density, metro adjacency, and metropolitan status. All three variables, however, have opposite effects of what would be predicted. Population density has a positive effect on the contribution of county industry mix to local earnings change. Areas in Appalachia with greater density have industry structures which were more conducive to growth in the 1989-92 recession. One might conclude

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that this represents an urbanization effect, but this effect is net of the negative effects of metropolitan status and metropolitan adjacency status. Metro areas, and metro adjacent areas had industry structures which were less competitive in the 1989-92 recession.

These negative effects of urbanization may be attributable to the nature of this recession. This was largely a white-collar recession, affecting white collar workers who tend to be concentrated in more metropolitan areas (Goe 1994). The effects of key new urban sociology variables underscore this point. Federal employment and education both had positive effects on earnings change related to industry mix. But the effects of education are significantly more diminished, compared to the effects of education during previous business cycles. In addition, federal employees are relatively exempt from the effects of recessions (compared to private sector employees). Therefore, areas with a greater concentration of federal employees may have industry mixes more favorable to earnings growth during recessions. Net of these effects, right-to-work status has a negative effect on earnings growth due to industry mix. It appears that right-to-work laws do not help to attract high growth industries.

Competitive Effects Results.

The results for the competitive effects show what characteristics of counties explain why certain counties have local industries that are growing faster than the national rate for those industries. Tables 4, 5 and 6 present the results when earnings change due to local competitive effects are regressed on the human ecology, new urban sociology and control variables. The model for the 1980-2 recession does not fit very well, explaining only 10% of the variation in earnings change attributed to county competitive effects. Among human ecology variables, age of housing has a negative effect on local competitive effects. Places with older housing (and by extension older infrastructures) had industries that were growing slower than the national average for those industries. Kasarda and Irwin (1991) show that ecological factors, such as density and infrastructure, have negative effects on the employment growth due to local competitive factors during recessions. This analysis shows that some of these same factors influence earnings growth in the same way. Among the new urban sociology variables, percentage of the labor force in federal civilian employment had a negative effect on earnings growth related to local competitive effects. Earnings in federal employment grew significantly lower than federal earnings nationally. This finding may demonstrate the lack of military spending in Appalachia (Couto 1994). Military spending increased dramatically during the first years of the Reagan Administration. However, Appalachia is relatively removed from the 'gunbelt,' therefore increases in civilian employment related to defense spending could have caused this negative effect in Appalachia. Whatever the reason, contrary to Mollenkopf's (1983) analysis, federal employment did not appear to benefit locales during this recession. The other variable with a significant effect is total earnings from agriculture and forestry. Earnings from agriculture and forestry grew faster in Appalachia than in earnings in these industries did at a national level.

---tables 4, 5, 6 about here---

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The competitive effect model for 1983-88 fits better, explaining almost 40% of the variation in earnings growth due to local competitive effects. Among human ecology variables, both of the infrastructure proxies (percent black, age of housing) have significant negative effects. Counties in Appalachia with older infrastructures, and infrastructures in poorer condition, have industries that grew slower than the national average for those industries. Conversely, areas with younger and better conditioned infrastructures have industries that are growing faster than the national average for those industries.

The effects among the new urban sociology variables are quite interesting. Per worker earnings in manufacturing has a negative effect on local competitive effects. These areas probably represent higher labor costs, and employers are less likely to expand production in these areas, thus helping earnings to grow. Areas with higher wages in manufacturing have industries that are growing slower than the national average, for these industry categories. Employers may be shifting production from these counties to lower wage labor markets. The positive effects of RTW status underscore this point. Counties in RTW states have industries that are growing faster than the national average for those industries, but when we examine the effects of RTW status for the industry mix effect, RTW status has a negative effect. Counties in Appalachia had industries that were growing faster than national industrial averages, but slower than the national growth rate for earnings. Education, on the other hand, has a positive effect. Theoretically, an educated workforce helps to attract new high growth industries.

Much of the variation in earnings related to local competitive effects stem from concentration in mining and agriculture/forestry. Mining dependent counties suffered during the 1980s. The demand for coal produced in this region declined dramatically when oil prices fell to under $20.00 a barrel. Agriculture/forestry concentration, on the other hand, had a positive effect on the earnings from local competitive effects. Farming and forestry grew faster in Appalachian counties than in the rest of the nation.

The model explains about 17% of the variation in local competitive effects during the 1989-92 recession. Age of housing has a negative effect. Those counties with older housing have industries which are less competitive, growing slower than the national average for those industries. Right-to-work status also has a negative effect. Counties in RTW states have industries that are growing slower than the national average for those industries for this time period. This is an interesting finding. RTW status has a positive effect on local competitive effects during the 1983-88 recovery. It appears that RTW laws help to attract industries that may be declining nationally during business cycle upturns. During recessions, earnings from these industries grow slower than the national rate for these industries. RTW work laws help to attract mature industries.

Agriculture/forestry and mining both have negative effects on local competitive effects. Areas that are more mining or agriculture/forestry dependent did not perform as well during this recession. The mining industry suffered terribly during the mid 1980s. Appalachian staples (tobacco, beef, dairy products)

also suffered drops in demand during this period. This may explain why areas with mining and agriculture/forestry had slower growing industries during this time period.

Discussion

The objective of this paper was to test theoretical assumptions from the new urban sociology and human ecology, using Appalachia as a case study, and explain a) why some communities in Appalachia have faster growing industries than others (where earnings grow faster than national average for all industries); b) why some communities in Appalachia have industries that are growing faster than the national growth rate for those industries. First, unlike Kasarda and Irwin's (1991) national analysis of employment growth rates, this analysis does not show particularly clear evidence for one perspective, or the other. Kasarda and Irwin show that a number of ecological constructs (but mainly population density) are relatively more important in explaining local employment growth that is unrelated to local industry structure. However, my analysis shows that measures from both perspectives are important in explaining variation in earnings growth both related and unrelated to county industry mix.

Among the human ecology measures, age and condition of infrastructure had consistent, expected effects on explaining why some regions have faster growing industries than others. Areas with older housing (and by extension older roads, sewer systems, telecommunications hardware, etc), and areas with a greater percentage of the population black (and by extension infrastructures in poorer condition -- see Talley and Cotton 1993) have slower growing or declining industry structures. The theoretical link is that these conditions introduce higher production costs, making it less likely that new growth industries will choose to locate in those areas.

Among the new urban sociology measures, business climate measures (quality of workforce, labor market conditions) have consistent, expected effects in explaining why some areas have faster growing industry mixes than others. Communities in Appalachia which have a better educated adult population, and a lower wage labor market have industry structures where earnings are growing at a faster rate. The theoretical link is that local business elites forge alliances with local political elites to create a pro-business climate (low wages, low taxes, anti-union) that will attract industrial development. Included in that development strategy may be a better educated workforce, which can be a useful tool to help attract new high growth industries. Federal employment did have a positive effect on industry mix effects in the 1989-92 recession. Federal employees represent areas of greater federal employment. Such employees are generally less affected by downturns in the economy (compared to private sector and non-profit employees).

Several measures from both perspectives have unanticipated effects that need to be commented on. From the human ecology literature, metro adjacency and metropolitan status both have negative effects on earnings due to industry structure effects during the 1989-92 recession. Metropolitan areas are generally believed to outperform nonmetropolitan areas on these issues (Lichter and McLaughlin 1995). However, this analysis documents a negative effect. One possible explanation is that the 1989-92 was a

white-collar recession, where the tendency is for white-collar workers to be concentrated in metropolitan areas. Therefore, it might be expected that urbanization has a negative effect on earnings growth related to industry structure. Net of these effects, however, population density has a positive effect on earnings related to industry structure. In this equation, population density may capture the effects of more populated nonmetro counties in Appalachia. In an analysis of nonmetro counties in Appalachia, Mencken (Forthcoming) shows that there are distinct differences in socio-economic well-being between 1980 and 1990. One of the important factors identified in his analysis is the relative size of towns in these counties, and the diversity of their industry structures. The positive effects of population density in this analysis may be capturing some of the same performance differences among nonmetro counties in Appalachia documented by Mencken (Forthcoming).

Among new urban sociology measures, right-to-work status has negative effects that are contrary to theoretical expectations. Right-to-work status is a business climate proxy measure, which is supposed to measure an anti-union sentiment in the state in which the laws apply. This analysis shows that counties in right-to-work states had slower growing industries in both 1983-88 and 1989-92 cycles, once the effects of other variables are controlled. However, the measure for wages from manufacturing may explain what right-to-work status is supposed to capture. Manufacturing is still one of the most unionized industry sectors. Unions generally mean higher wages. Therefore, the effects that a pro- or anti-union sentiment might have on attracting high growth industries may be captured by this measure.

The models for competitive effects are less effective at explaining earnings growth unrelated to local industry structure. Infrastructure has consistent negative effects across all models. Net of the effects of current industry structure, earnings grew at a slower rate in areas with older housing (and by proxy older infrastructures). This is probably because these areas could not attract new employment opportunities (Kasarda and Irwin 1991). Among the new urban sociology measures, education, average earnings per manufacturing worker, and right-to-work status all have significant effects in various models. The interesting finding is that right-to-work status has a positive effect on earnings growth unrelated to industry structure during the 1983-88 recovery, while RTW status has a negative effect on industry structure mix effects during this time period. One explanation is that RTW status was helping to attract industries not included in the industry mix formula. Therefore, RTW status will have a positive effect unrelated to industry mix. However, counties in RTW states had slower growing industries, compared to non RTW states.

The lack of effects among a number of variables have interesting policy implications. One of the findings of the President's Appalachian Regional Commission was that Appalachia lacked the requisite transportation infrastructure needed to stimulate economic development and alleviate social problems in the region. Currently, less than one half of Appalachian counties have an interstate highway. However, this analysis fails to show that interstate access is a key variable that helps areas to recruit new high growth industries.

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Another important issue is the lack of effects for federal spending variables. The new urban sociology maintains that federal spending policies help to create economic growth in certain regions (Markusen 1994), oftentimes at the expense of other regions (Falk and Lyson 1993). However, this analysis fails to detect any significant federal spending effects. One possible explanation is that Appalachia is relatively removed from the 'gunbelt,' or regions where defense spending is high (Couto 1994). Therefore, the lack of federal defense spending may explain the lack of federal effects.

Conceptually, I have argued that an educated population is a competitive effect for local communities. But recent research by Bartik may challenge that assumption. Bartik (1993) shows that 4 out of 5 new jobs goes to in-migrants. Therefore, we might not expect that employers are locating jobs in an area to take advantage of the skilled workers, but that the jobs are attracting the skilled workers to that region. More data on the effects of education are needed before arriving at a definitive answer for this effect. I have also argued that percent black represents an area with an inadequate and under-developed infrastructure. But many reasons why these areas have had poor infrastructures are better explained by the new urban sociology perspective. How monies are invested in infrastructure is a political process. Blacks in the U.S. have historically been excluded from this political process, and segregated into communities that have been on the losing end of these political decisions (Wilson 1987). Therefore, these areas lack the infrastructure development to compete with other regions for new jobs (whether they be in declining industries or not). But the lack of infrastructure may have its origin in local political conflicts, a conclusion more at home on the agency end of the continuum.

The objective of this paper was to test assumptions from two theoretical perspectives at opposing ends of the structure-agency continuum. The analysis shows that while some of the measures from each perspective are important, neither theory is supported at the refutation of the other (unlike Kasarda and Irwin's analysis which showed a clear pattern of support for the human ecology perspective. If sociologists are to understand why some communities are winners and losers, more theoretical development is necessary. One promising avenue stems from Piore and Sabel's (1984) treatise on post-fordist flexible production. Locales with smaller, more flexible manufacturing should perform better during recessions and recoveries than locales with larger, less flexible enterprises. Sociologists are beginning to pursue this line of thinking. Lyson and Tolbert (Forthcoming) show some support for the hypothesis that smaller manufacturing is better for the overall socio-economic well-being of a community. However, greater theoretical development is needed so that this or other perspectives can be utilized to address the questions presented in this research.

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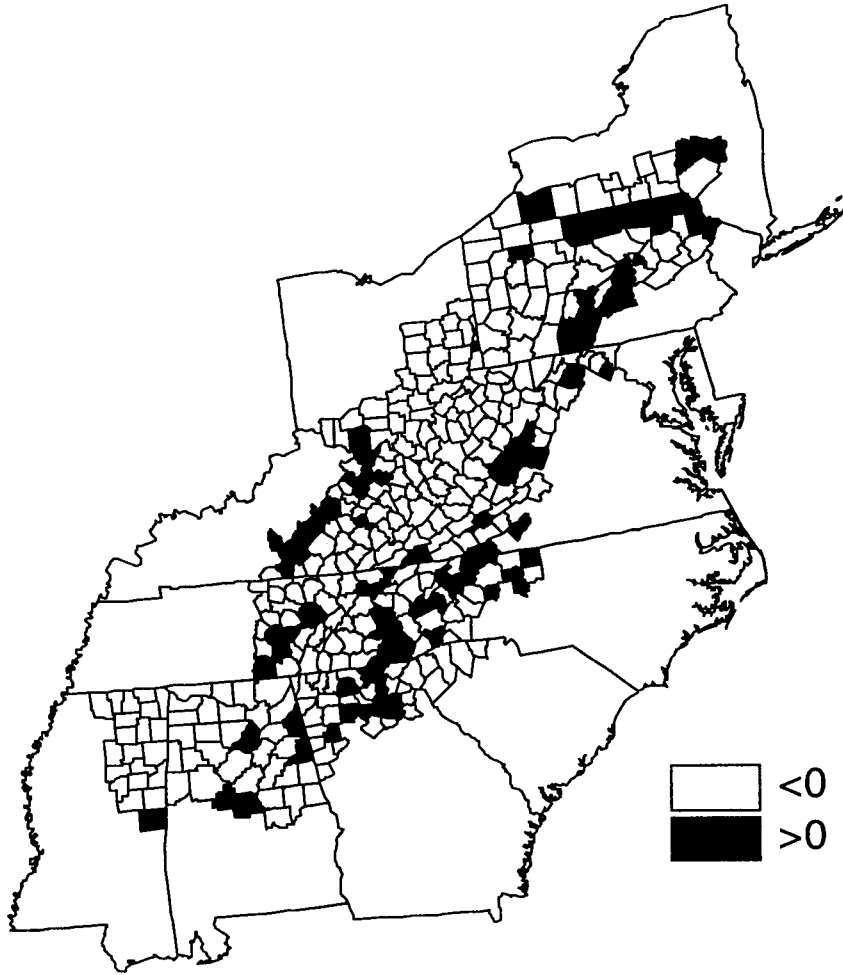
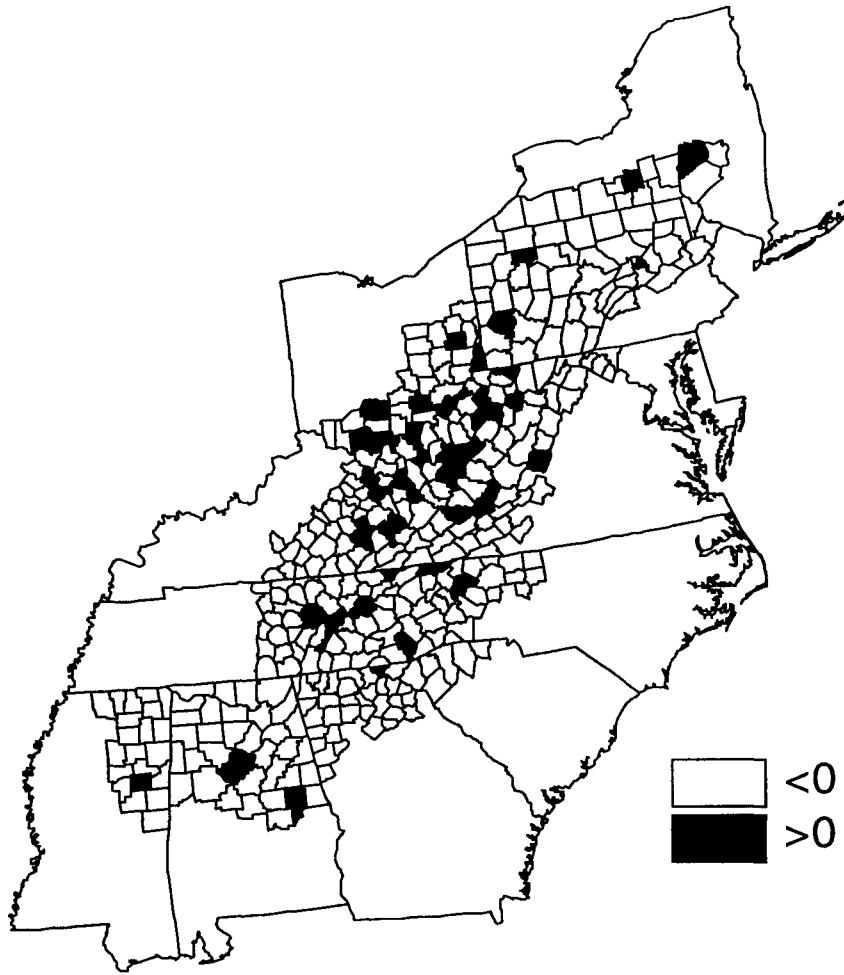# Map 1. Appalachia
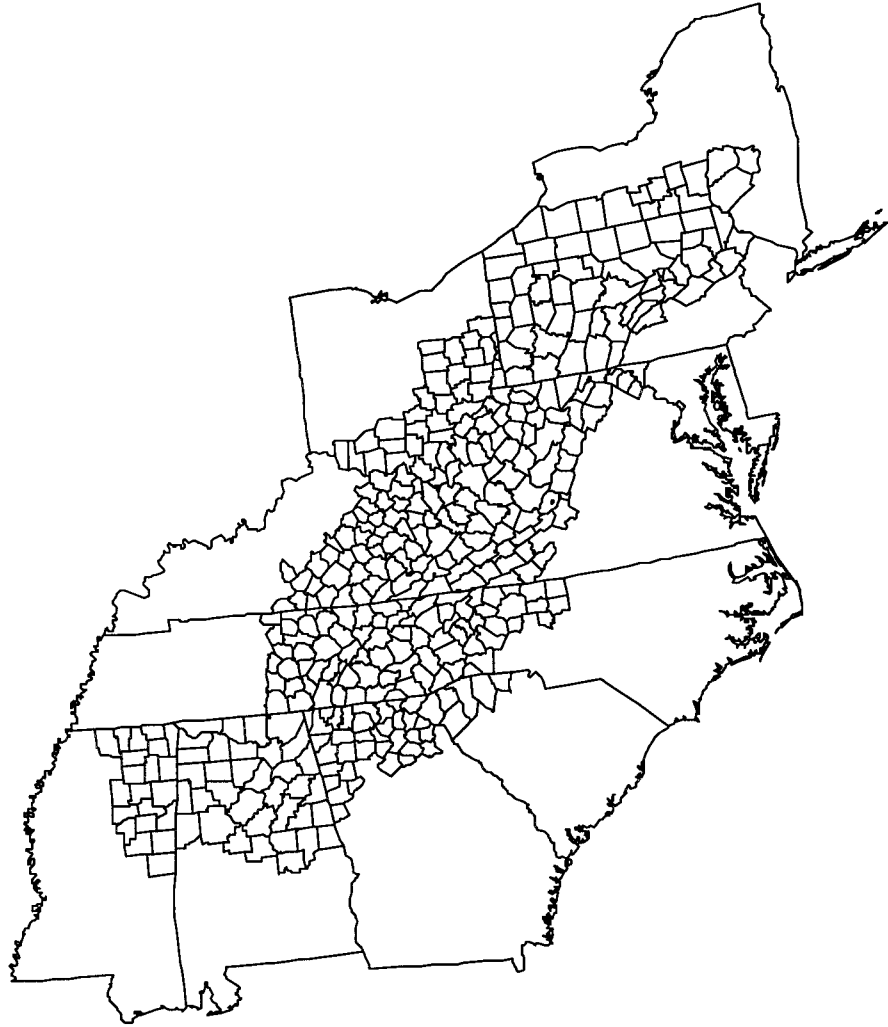
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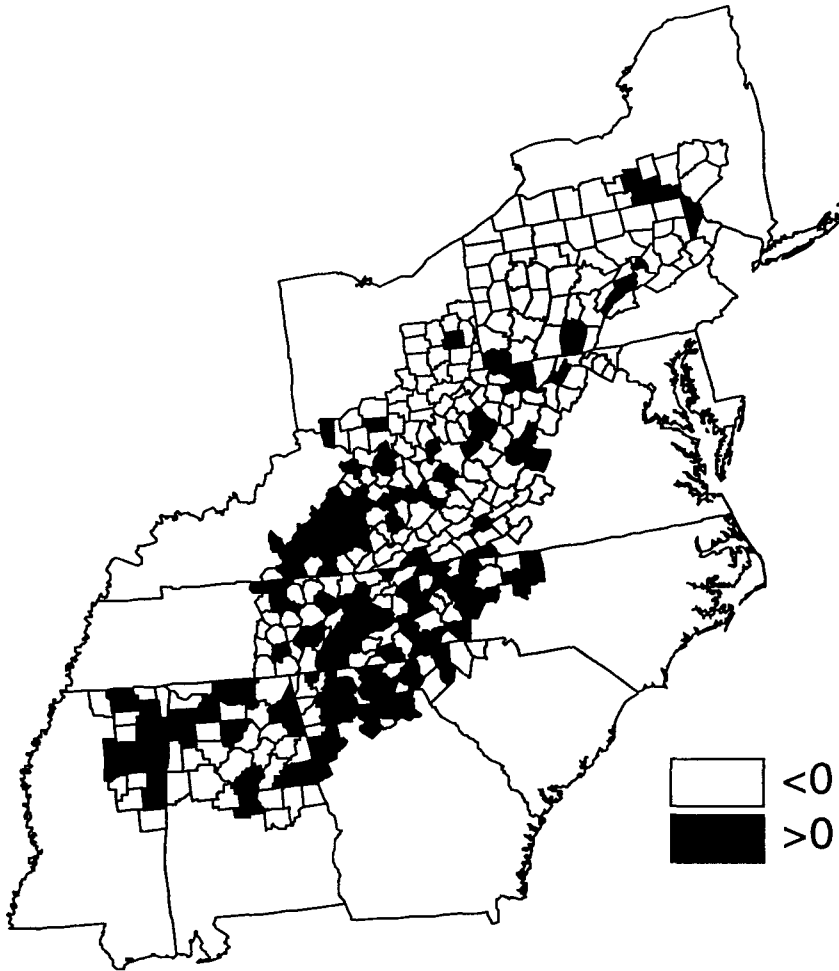

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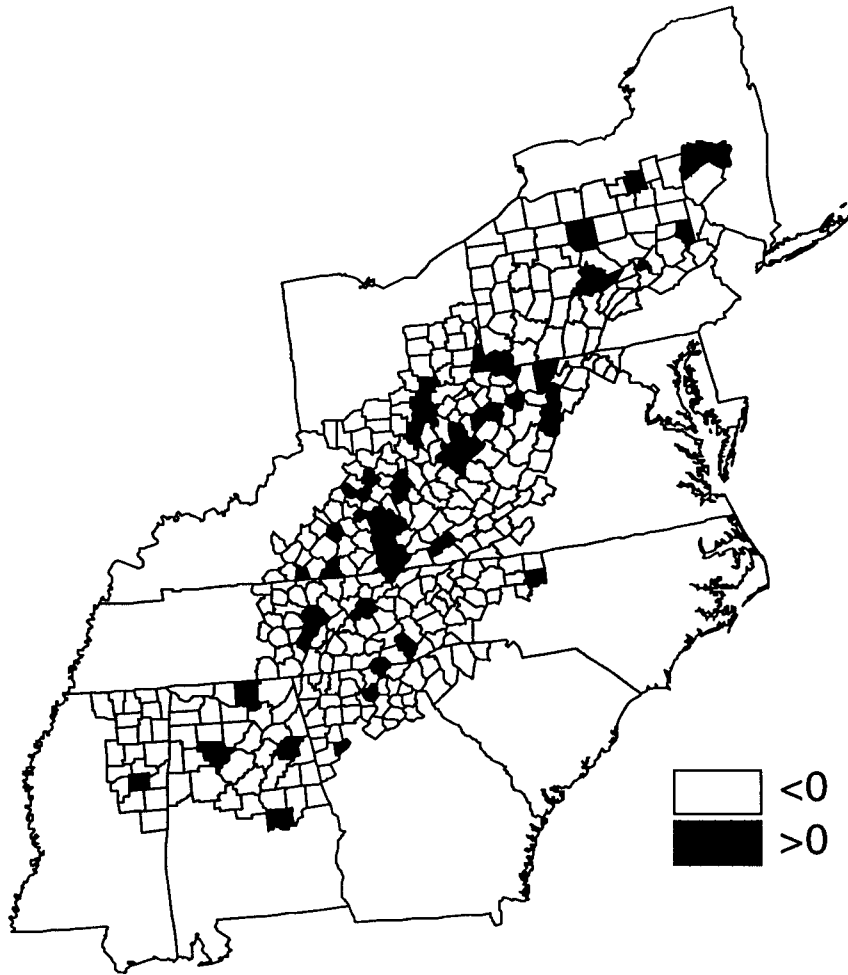
Map 3. Industry Mix Effects, 1983-1988

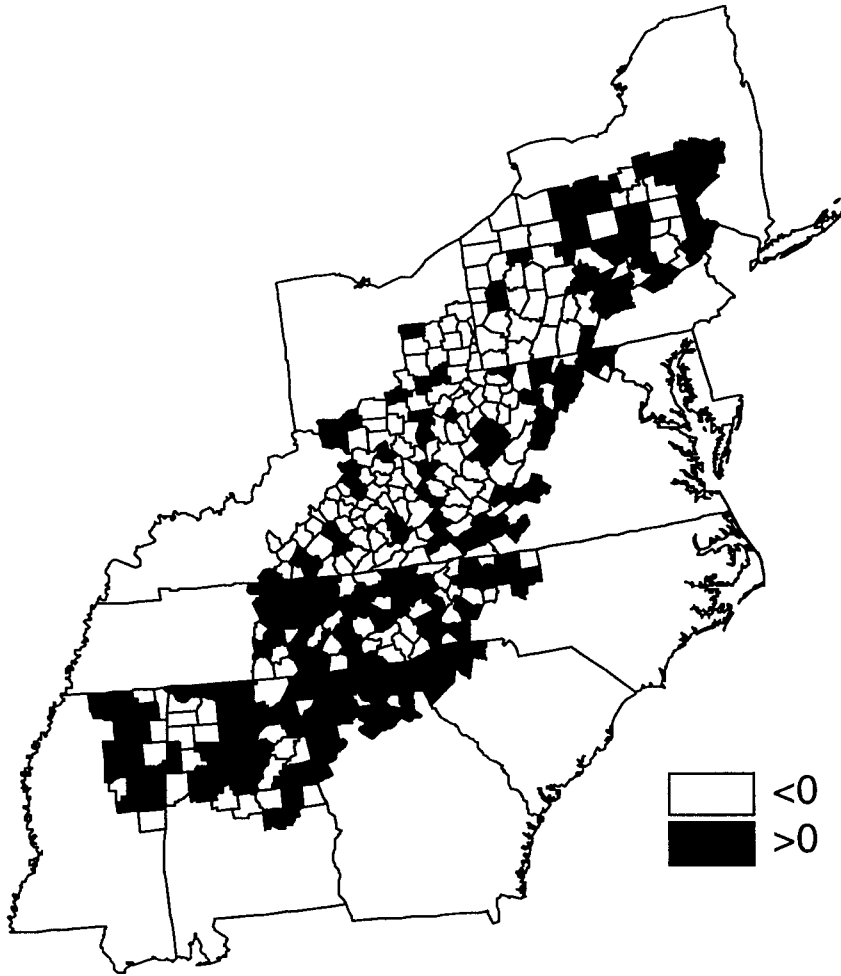# Map 4. Industry Mix Effects, 1989-1992

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Map 5. County Effects, 1980-1982

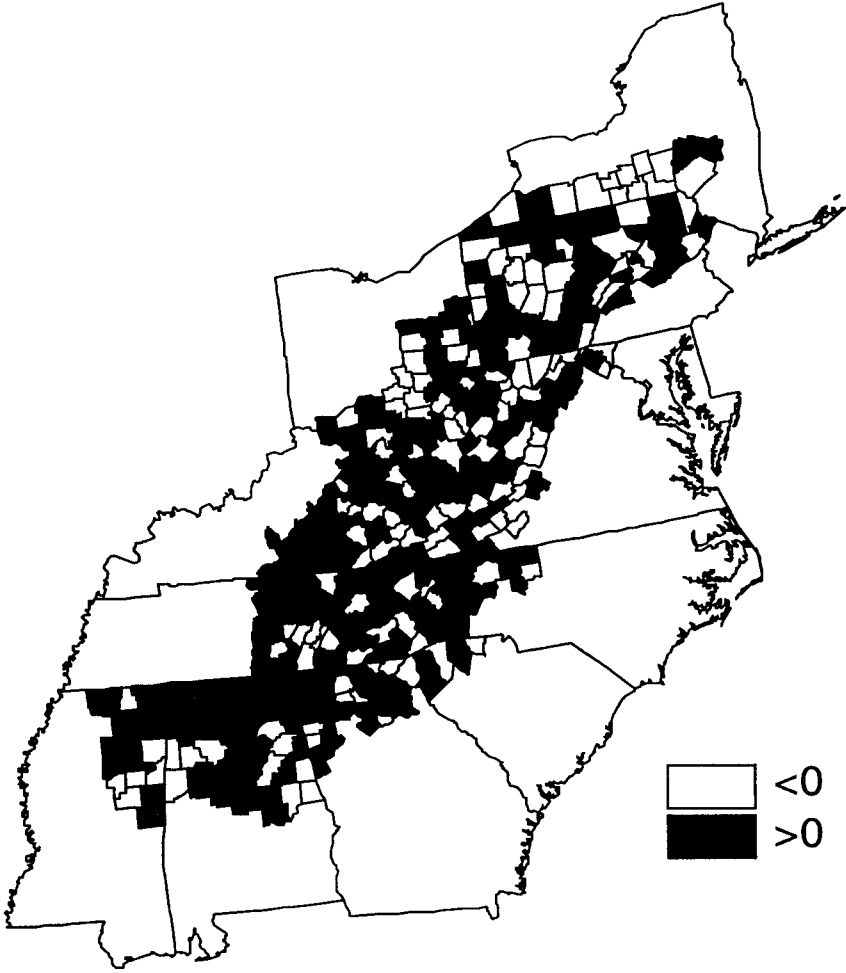# Map 6. County Effects, 1983-1988

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Map 7. County Effects, 1989-1992

Table 1.   Two Stage Least Squares Results, Industry Mix 1980-82
Recession (n=399).

	UnStd Est.	Std Est.	Variance Inflation
Human Ecology Measures			
Percent Black 1980	-.021	-.082	1.512
Population Density 1980	-.0001	-.039	1.535
Age of Housing 1980	-.003	-.025	1.675
Interstate Highway 1980	-.0003	-.007	1.289
Metropolitan County	-.004	-.087	1.858
Adjacent to Metro County	-.0002	-.004	1.646
New Urban Sociology Measures			
% of Adults w/GT High School Education 1980	.095***	.266	1.511
Federal Spending per capita 1980	.0004	.030	1.154
% Labor Force Federal Emp. 1980	.051	.076	1.173
Right-to-Work Status	-.005	-.120	2.091
Earnings per Manuf. Worker 1980	-.0006***	-.217	1.283
Control Variables			
% Total Earnings in Mining 1980	.002***	.188	2.005
% Total Earnings in Agric/Forestry 1980	.0006	.052	1.242
Lag Term Previous Change	.066*	.156	2.092
Land-Deane Spatial Effects Term	.0002	.068	1.507
Intercept	-.101		
Adj. R-Square	.217***		

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

Table 2. Two Stage Least Squares Results, Industry Mix 1983-88 Recession (n=399).

	UnStd Est.	Std Est.	Variance Inflation
Human Ecology Measures			
Percent Black 1980	-.127*	-.103	1.344
Population Density 1980	-.0002	-.003	1.539
Age of Housing 1980	.036	.046	1.773
Interstate Highway 1980	-.007	-.029	1.260
Metropolitan County	.001	.004	1.510
Adjacent to Metro County	-.003	-.057	1.178
New Urban Sociology Measures			
% of Adults w/GT High School Education 1980	.754***	.414	1.628
Federal Spending per capita 1983	-.002	-.041	1.132
% Labor Force Federal Emp. 1983	-.206	-.057	1.128
Right-to-Work Status	-.028*	-.125	2.006
Earnings per Manuf. Worker 1983	-.001**	-.111	1.354
Control Variables			
% Total Earnings in Mining 1983	-.018***	-.387	1.527
% Total Earnings in Agric/Forestry 1983	.034***	.436	1.450
Lag Term Previous Change	.139	.027	1.222
Land-Deane Spatial Effects Term	.001	.042	1.345
Intercept	-.096***		
Adj. R-Square	.512***		

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

Table 3.   Two Stage Least Squares Results, Industry Mix 1989-92 Recession (n=399).

	UnStd Est.	Std Est.	Variance Inflation
Human Ecology Measures			
Percent Black 1990	-.004	-.020	1.396
Population Density 1990	.0001*	.119	1.668
Age of Housing 1990	.011	.065	1.607
Interstate Highway 1990	-.002	-.048	1.285
Metropolitan County	-.006*	-.128	1.612
Adjacent to Metro County	-.001**	-.131	1.054
New Urban Sociology Measures			
% of Adults w/GT High School Education 1990	.046**	.181	1.898
Federal Spending per capita 1989	-.0001	-.001	1.116
% Labor Force Federal Emp. 1989	.104*	.100	1.137
Right-to-Work Status	-.005*	-.124	1.945
Earnings per Manuf. Worker 1989	-.0001	-.007	1.072
Control Variables			
% Total Earnings in Mining 1989	.001***	.227	1.831
% Total Earnings in Agric/Forestry 1989	-.008	-.080	1.831
Lag Term Previous Change	.029*	.153	1.790
Land-Deane Spatial Effects Term	.0001	.049	1.285
Intercept	-.029***		
Adj. R-Square	.192***		

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

Table 4. Two Stage Least Squares Results, County Effect 1980-82 Recession (n=399).

	UnStd Est.	Std Est.	Variance Inflation
Human Ecology Measures			
Percent Black 1980	-.026	-.024	1.507
Population Density 1980	-.0001	-.015	1.537
Age of Housing 1980	-.200***	-.291	1.611
Interstate Highway 1980	.008	.042	1.279
Metropolitan County	-.002	-.009	1.827
Adjacent to Metro County	-.009	-.047	1.643
New Urban Sociology Measures			
% of Adults w/GT High School Education 1980	.139	.089	1.510
Federal Spending per capita 1980	.004	.068	1.151
% Labor Force Federal Emp. 1980	-.321*	-.109	1.166
Right-to-Work Status	-.012	-.064	2.087
Earnings per Manuf. Worker 1980	-.0009	-.069	1.260
Control Variables			
% Total Earnings in Mining 1980	.001	.048	1.291
% Total Earnings in Agric/Forestry 1980	.006*	.115	1.507
Lag Term Previous Change	-.006	-.001	1.035
Land-Deane Spatial Effects Term	.0004	.026	1.500
Intercept	.189***		
Adj. R-Square	.097***		

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

Table 5. Two Stage Least Squares Results, County Effect 1983-88 Recession (n=399).

	UnStd Est.	Std Est.	Variance Inflation
Human Ecology Measures			
Percent Black 1980	-.591***	-.188	1.329
Population Density 1980	-.0001	-.034	1.537
Age of Housing 1980	-.271*	-.137	1.861
Interstate Highway 1980	.011	.018	1.261
Metropolitan County	.057	.090	1.492
Adjacent to Metro County	-.003	-.020	1.138
New Urban Sociology Measures			
% of Adults w/GT High School Education 1980	.846***	.183	1.546
Federal Spending per capita 1983	-.013	-.080	1.137
% Labor Force Federal Emp. 1983	-.534	-.053	1.122
Right-to-Work Status	.067*	.116	2.005
Earnings per Manuf. Worker 1983	-.004**	-.126	1.330
Control Variables			
% Total Earnings in Mining 1983	-.047***	-.398	1.463
% Total Earnings in Agric/Forestry 1983	.022*	.115	1.468
Lag Term Previous Change	-.098	-.033	1.119
Land-Deane Spatial Effects Term	-.004*	-.121	1.350
Intercept	.318***		
Adj. R-Square	.375***		

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

Table 6. Two Stage Least Squares Results, County Effect 1989-92 Recession (n=399).

	UnStd Est.	Std Est.	Variance Inflation
Human Ecology Measures			
Percent Black 1990	-.033	-.029	1.416
Population Density 1990	.0003	.044	1.661
Age of Housing 1990	-.313***	-.358	1.650
Interstate Highway 1990	-.003	-.013	1.283
Metropolitan County	.014	.063	1.616
Adjacent to Metro County	-.0002	-.086	1.057
New Urban Sociology Measures			
% of Adults w/GT High School Education 1990	-.146	-.116	1.762
Federal Spending per capita 1989	-.001	-.014	1.127
% Labor Force Federal Emp. 1989	.051	.010	1.135
Right-to-Work Status	-.034*	-.160	1.894
Earnings per Manuf. Worker 1989	-.002	-.086	1.057
Control Variables			
% Total Earnings in Mining 1989	-.007***	-.202	1.503
% Total Earnings in Agric/Forestry 1989	-.005*	-.101	1.085
Lag Term Previous Change	-.019	-.052	1.554
Land-Deane Spatial Effects Term	.002*	.142	1.281
Intercept	.241***		
Adj. R-Square	.162***		

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