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SPATIAL VARIATION IN POVERTY-GENERATING PROCESSES: CHILD POVERTY IN THE UNITED STATES

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Abstract

This study builds on research demonstrating that sub-regions within the United States have different processes that abet poverty and that child poverty is spatially differentiated. We focus on the social attributes of the local area to assess what the geographic place represents in terms of social characteristics, namely racial/ethnic composition and economic structure, and to resolve apparent inconsistencies in poverty research. Using spatial regime and spatial error regression techniques to analyze county census data, we examine spatial differentiation in the relationships that generate child poverty. Our approach addresses the conceptual and technical aspects of spatial inequality. Results show that local-area processes are at play with implications for more nuanced theoretical models and anti-poverty policies that consider systematic differences in factors contributing to child poverty according to the racial/ethnic and economic contexts.

Keywords

child poverty; spatial differentiation; spatial heterogeneity; spatial regime; spatial regression; United States

1. INTRODUCTION

The United States has one of the highest average incomes in the industrialized world and, strikingly, it has one of the highest rates of poverty (Iceland 2006; Smeeding, Rainwater, and Burtless 2001). Although poverty declined in recent decades, falling from 13.7 percent in 1969 to 11.3 percent in 1999 (Dalaker 2001; U.S. Census Bureau 1993), recent estimates show that poverty is on the rise with nearly 43 million Americans (14.3%) living in poverty

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in 2009 (American Community Survey 2010). Of particular concern, economic vulnerability is especially acute for the youngest population. Poverty among America's youth has been increasing since the 1990s while, in contrast, it has been steadily declining among the older population. Despite the nation's wealth, 16% of its children were living in poverty in 1999 and the proportion increased to 20% of children (23.2% of children less than 5 years-old) in 2009. Also of concern is the spatial inequality of poverty. Some regions are particularly disadvantaged, most notably the South with a regional poverty rate higher than 16% in 2009.

Scholars have recognized the spatial patterning of poverty in the United States and the role of place in aggravating and reproducing poverty (Adams and Duncan 1992; Glasmeier 2006; Lobao 2004; Lobao and Saenz 2002; O'Connor 2001; Weinberg 1987). Appalachia, the Mississippi Delta, the Texas borderlands, and tribal reservations and communities have been given varying degrees of analytical attention because of the high and persistent concentration of poverty within these areas (Billings and Blee 2000; Dill and Williams 1992; Duncan 1992a, 1992b; Slack et al. 2009; Saenz and Ballejos 1993; Snipp and Summers 1992; Voss et al. 2006). To understand the spatial differentiation in poverty, researchers have analyzed poverty within spatial units (Friedman and Lichter 1998; Lobao 1990; O'Hare and Johnson 2004; Slack et al. 2009), explicated the historical underpinnings of poverty in select geographic sub-regions (Billings and Blee, 2000; Dill and Williams, 1992; Duncan, 1992a; 1992b; Snipp and Summers, 1992), and made efforts to identify the role of place in encouraging poverty (Cotter 2002; Lichter and McLaughlin 1995; Lichter et al. 1993). This large body of research has demonstrated that the burden of poverty is unevenly distributed across the United States and it is closely linked to the uneven distribution of social and economic factors.

The central objective of this paper is to assess spatial differentiation in the *relationships* between child poverty and its dominant drivers. Specifically, we examine the extent to which racial/ethnic composition and the economic structure of a local area modify the relationship between child poverty and its other predictors. What are the factors driving child poverty? Why is child poverty high in some areas, but not others? These questions persist, at least in part, because of inconsistencies in empirical results due to incomplete modeling strategies. An analysis of child poverty that explicitly incorporates variation in social contexts, we assert, offers a more informed understanding of the factors that facilitate the social injustice of child poverty in an otherwise wealthy nation.

We take on the conceptual and the technical "spatial" dimensions of child poverty to advance the understanding of spatial inequality. Space is implicit in any county-level analysis of poverty or, more generally, in the analysis of any spatially-conceptualized and -defined unit (e.g., community, village, neighborhood, census tract, state). Social science research on aggregate-level poverty has taken a more spatially-informed perspective in recent years (Slack et al. 2009; Voss et al. 2006). These studies have corrected for model estimation problems associated with analyzing spatially-referenced data. The current analysis extends the conceptual treatment of space by examining the potential conditioning influence of geographic context. Our results demonstrate that the vast amount of work on county-level poverty and other socioeconomic conditions that does not account for spatial processes is empirically incorrect and can lead to erroneous theoretical conclusions.

We aim to advance the understanding of the spatial differentiation of child poverty and, ultimately, how to ameliorate the deep social problems that accompany poverty at the individual, family and community level. To do so, we ask whether the relationships between child poverty and previously established correlates of poverty are similar across the United States, or whether they vary among particular sub-regions, including socially-defined rather than strictly geographically-defined places. We focus on the conditioning influences of

racial/ethnic composition and economic structure in altering variation in child poverty's association with known covariates. Broadly, variation in the relationships would support the argument that much can be gained by moving away from the perspective that theoretical models of inequality and poverty, in particular, can be analyzed at a given level of geography and generalized across all contexts (Lobao 1993; Lobao, Hooks, and Tickamyer 2007). Advances in theoretical models that prioritize either race/ethnicity or economic structure can result from the analysis of the conditions under which different relationships emerge; the meaning of racial/ethnic concentration and economic structure might vary according to the value of the other. To this end, our research is a useful extension of standard and, indeed, spatial regression approaches. As we discuss below, inconsistent results across studies can be resolved through this analytical approach. Moreover, our approach helps explain inconsistent findings. For example, the nature of the local economy shifts the association between race/ethnicity and child poverty; the association is strongly associated in some areas and unrelated in others.

In addition to advancing theoretical models, such information can inform potential policy strategies for ameliorating poverty in different types of places, for example, based on racial/ethnic concentration or economic dependence. A policy may have varying effectiveness based on the relative importance of the targeted correlate of poverty in different places given the nature of the local area economic structure or racial/ethnic dynamics.

2. SPATIAL DIFFERENTIATION IN CHILD POVERTY

Research analyzing geographic units that does not account for spatial processes is empirically incorrect. The extent to which the empirical inaccuracies lead to flawed theoretical interpretations depends on the strength and type of spatial process underlying the data. In some instances, key explanatory variables adequately capture the underlying spatial process. In other instances, spatially lagged dependent variables or error terms are necessary to produce consistent and efficient results. Still, in other instances, the spatial process operates at a higher order and produces unstable estimates that cannot be generalized across the study region. It is also possible that multiple forms of spatial effects are present, as in the current study. Given the myriad types of spatial effects at play in social science data, researchers must seriously engage in spatial thinking or risk conducting a naïve and erroneous analysis.

Friedman and Lichter (1998) were among the first to directly address the spatial differentiation in child poverty at the national level. Their approach was analytically improved in a subsequent reanalysis (Voss et al. 2006).[1] The role of local labor market conditions in shaping the spatially uneven distribution of child poverty across US counties is a central focus of these studies. In addition to economic structure, however, the analyses examined the impacts of racial/ethnic composition and regional status. Statistical accounting for region, employment structure or racial/ethnic composition provides a useful strategy for understanding the spatial distribution of child poverty in a multivariate ecological framework. The current study extends the understanding of spatial inequality in poverty by explicitly examining whether the social attributes of the geographic context, namely racial composition and economic structure, modify the process generating child poverty.

Recent research on inequality informs spatial thinking about poverty by emphasizing the importance of local variation. McCall (2001) demonstrates local areas have contrasting inequality-producing configurations based on the nature of the local economy. Other factors

[1]Examples of spatially-informed analyses of poverty are also found in the health and economic literatures. See Levernier, Partridge, and Rickman (2000) for a regional comparison and Holt (2007) and Rupasingha and Goetz (2007) for national-level analyses.

correlated with inequality (and poverty), such as unemployment, education and racial composition, are conditioned by the local area economic context. In our study, we assert that these social and economic characteristics which are bounded in socially constructed spaces affect the poverty-generating process. Because the factors are not evenly distributed across the nation, the extent of child poverty is not evenly distributed; hence, spatial differentiation in poverty can be understood by differences in the underlying distribution of factors generating the distribution. Moreover, we assert that certain factors, namely industry and race, condition the poverty-generating process; there is spatial differentiation in the processes generating poverty. To investigate the interactive association, we use a statistical regime approach which has the benefit of parsimoniously analyzing all local areas simultaneously, thus yielding a broad view of the processes generating child poverty.

We focus on spatial units (counties) in the current context, but we emphasize that spatial units are of interest because they embody the social factors that produce inequality. In their contextual analysis of family poverty, Cotter and colleagues argue that "poverty happens to individual families, but it happens in contexts that shape the size and nature of each family's risk" (2007:163). We add to this assertion that poverty also happens to communities and places; the contexts that influence the individual family's risk are comprised of the structural factors that shape the overall poverty experienced in the places in which families work and live.

Drawing on the conceptual contributions of Lobao (e.g., Lobao, 1993; Lobao, Hooks, and Tickamyer, 2007) and Massey (1994), we argue that geographic space represents a socially constructed, physically bounded area that holds characteristics which intersect with location to create divergent social, economic, and political outcomes across sub-areas within the larger spatial region. We are interested in whether the social forces bounded in the county intersect to influence the extent of child poverty to different degrees across the United States.[2] Such variation is a type of spatial heterogeneity (LeSage 1999), namely differentiation in the magnitude and nature of relationships across the spatial region. This perspective challenges the "constancy assumption" (Freedman et al. 1991:678) that the slope of a regression line, or the average association among all units, applies to the separate units that comprise the whole. Working from this assumption, for example, unemployment is asserted to have the same association with child poverty in all counties. Spatial heterogeneity, in contrast, assumes that regionally-specific circumstances influence structural relationships (O'Loughlin, Flint, and Anselin 1994:359). According to the spatial heterogeneity assumption, unemployment rates are expected to have different associations with child poverty across spatial units.

Spatial heterogeneity in relationships is conceptually consistent with Doreen Massey's description of how places are particular outcomes of intersecting social relations (1994:120). She argues that the unique combination of social forces "together in one place may produce effects which would not happen otherwise" (1994:156). These social forces often include non-material factors (e.g., cultural and/or historical processes) that cannot easily or always be quantified, yet these forces shape otherwise measureable social relationships. The analytical challenge is to investigate social relations of interest while accounting for the potential impact of other forces, measureable and quantitatively elusive.

[2]The county is the standard unit of analysis for studies of aggregate-level poverty and child poverty since the county is a meaningful political unit; the county is the level at which federal anti-poverty programs are administered. A sizeable literature focuses on sub-county poverty (i.e., census tracts), mainly urban poverty (see, for example, Jargowsky 1997; Massey and Eggers 2008; Massey, Gross, and Shibuya 1994; South et al. 2005). A focus on the county permits the analysis of poverty across the urban continuum rather than the exclusive concentration of poverty within an urban area.

2.1. Social Sources of Spatial Heterogeneity

Research to date has demonstrated that the spatial distribution of poverty corresponds with two key social factors: racial/ethnic concentration and economic structure. A long-standing body of research argues that areas with "racial legacies" confront heightened inequality and socioeconomic hardships which aggravate poverty (Saenz 1997; Slack et al. 2009; Snipp 1996; Swanson et al. 1994). A similar body of research has established the impacts of population composition. This work has found that racial and ethnic minorities living in or near places with a high concentration of minorities have lower economic outcomes relative to non-minorities—a finding that has been interpreted as a result of higher minority visibility which, in turn, leads to greater racial discrimination (Cohn and Fossett 1995; Blalock 1967; Beggs, Villemez, and Arnold 1997; Tigges and Tootle 1993; Tolnay, Deane, and Beck 1996). However, other studies have come to the opposite conclusion (Frisbie and Neidert 1977; Semyonov, Hoyt, and Scott 1984) perhaps due to racial/ethnic dynamics in the labor queue; once the labor supply is glutted, in part, due to a relatively high concentration of minorities, minority workers "overflow" into good jobs (Kornrich 2009:5).

The conflicting findings and interpretations suggest nevertheless that the mechanisms leading to child poverty may differ between places with high racial/ethnic minority concentration versus places with low concentration. The factors affecting poverty may be conditioned by the social forces, material and non-material, attached to places with high concentrations of racial/ethnic minorities. Examples of potential non-material forces at play include informal discrimination and a historical legacy of once formalized discrimination often stressed in regional (namely southern) and racial/ethnic studies of poverty.

A second, well-established view in the literature is that the distribution of poverty corresponds with the nature and type of local economic structure. The local labor market indirectly affects child poverty through adult employment and earning opportunities. Yet, the evidence on this issue is mixed. No association has been found in some places while a strong association has been found in other areas. For example, Tickamyer and Tickamyer (1988) find an association between poverty and mining and agricultural industrial dependence; Tickamyer and Duncan (1990) find an association between poverty and resource-based economies; and Weinberg (1987) finds an association with manufacturing. Evidence is also varied when disaggregating manufacturing into core and periphery types (Tigges 1987) and in analyses of the different service industries (Reif 1987; Tomaskovic-Devey and Roscigno 1996).

Building from this research (see also McCall 2001), we argue that the variation in the association between types of industry and poverty reflected in earlier studies may result in unique contexts rooted in local area industrial structure. The distinctive context, in turn, could modify the influence of other social forces on child poverty. Economic structures are bounded within geography and, therefore, the association between child poverty and its other predictors might vary across spatial units according to the industrial composition of the bounded space.

We take an exploratory approach to investigate whether local area racial/ethnic composition and industrial structure condition the influence of other factors on child poverty. In this spirit, we entertain the possibility that racial/ethnic composition may modify the impact of industrial structure and that industrial structure may condition the relationship between racial/ethnic composition and child poverty. There are advantages to examining both potential modifying effects. Each approach conceptually prioritizes either race/ethnicity or industry and, thus, corresponds with different theoretical arguments about poverty dynamics. For example, treating racial/ethnic composition as the modifying factor is an extension of theories on group dynamics such as the racial threat thesis, whereas treating industrial

structure as the modifying factor is an elaboration of economically-oriented arguments including those based in the Marxist tradition. Both perspectives draw on the evidence that race/ethnicity and industry are deeply linked in the United States (see, for example, Saenz and Ballejos (1993) and Snipp (1996); for recent empirical examples see Kandel and Newman (2004), Kandel and Parrado (2005) and Liaw, Frey, and Wiley (2007)). The meaning of each factor may vary according to the other.

The uniqueness of place is often treated by introducing a control for distinctive geographic areas either as a dummy variable or through separate analyses of regions. For example, it is common to find in research on poverty a dummy control for the South or a separate analysis of the sub-region since it is thought to be distinct from the rest of the United States. However, we assert that it is worth contemplating how the South is unique from other areas. The legacy of slavery and a long-standing dependence on agriculture and a more recent industrial focus on the manufacturing sector are highly concentrated in the region. While more heavily rooted in the South, racial/ethnic tensions and dependence on a particular industry are not exclusive to the area. The sociological perspective prompts us to contemplate how the attributes often ascribed to the South might modify the relationship between poverty and its suspected predictors. That is, rather than controlling for the South or conducting a separate analysis for the South, a sociologically-motivated analysis examines the attributes characterizing the South. This approach enables us to articulate what it is about the South that sets it apart from other sub-regions, and whether these attributes, though less spatially concentrated in other sub-regions, have the same impact outside of the South. Thus, while we analyze geographic areas, our research examines the strength of contiguous neighbor spillovers and then extends beyond this traditional geographic context approach to examine social and economic characteristics that arise from the clustering of areas with shared characteristics that may or may not be geographically contiguous.

3. DATA AND METHODOLOGICAL APPROACH

Our data are taken from the 2000 U.S. Census of Population Summary Files 1 and 3 (U.S. Census Bureau 2001, 2002).[3] The county serves as the unit of analysis.[4] We generated a 3,071 county or county equivalent dataset from one initially containing all 3,109 contiguous US counties.[5] For the sake of comparability across geographies, wherever possible we dissolved “independent city” boundaries and aggregated the attributes of the city with those of the surrounding county. Independent cities are an anomalous political and census geography found mostly in Virginia.[6]

Our dependent variable is the logit transformation of the proportion of children in poverty.[7] Measures of racial/ethnic concentration and industrial structure consistent with previous research are included to assess the extent to which these attributes modify the relationship between child poverty and other factors commonly associated with poverty, namely

[3]Census 2000 provided the most recent complete data on all US counties at the time this research was conducted. More recent data are now available through the American Community Survey (ACS).

[4]See footnote 1 for a discussion of the motivation for a county-level analysis.

[5]Hawaii and Alaska are excluded due to non-contiguity issues that affect the spatial analysis and, related, the extreme heteroskedasticity that is introduced in the data when the two non-contiguous states are included. Additionally, the racial/ethnic issues discussed for the lower 48 presumably would be different if Alaska natives and Native Hawaiians were included.

[6]For more information on independent cities see the Census Bureaus glossary (http://www.census.gov/geo/www/tiger/glossary.html). We removed independent city geographies from the dataset by integrating attributes into adjacent geographies for the independent cities of Baltimore, St. Louis and 36 Virginia independent cities. We merged the polygons and associated data for these cities with their “parent” counties. Carson, NV, had no obvious parent county, so we left it unchanged.

[7]According the 2000 Census (Summary File 3), two counties, Hinsdale, CO and Loving, TX, had zero children in poverty. We declared these two observations to be outliers and re-estimated the proportion of children in poverty based on a regression imputation technique. The imputed proportion of children in poverty is 19% for Loving County and 7% for Hinsdale County.

demographic structure (i.e., female-headed households), other measures of economic conditions (i.e., unemployment), and human capital (i.e., education).

The racial/ethnic concentration of the non-Hispanic African American, non-Hispanic American Indian, and Hispanic populations is measured as the proportion of the respective race/ethnic group relative to the total county population. These data are also used to create two racial regimes, one reflecting high minority concentration and one corresponding to low minority concentration. The 25% threshold was selected based on the empirical distribution of the racial/ethnic minority population. The racial threshold is conservative (greater than the national average of 10%) and reflects an especially high concentration of racial minorities.

Industrial structure is measured through a typology code that designates the county economic dependence. The typology, designed by the USDA Economic Research Service (ERS), was appended to each county record. According to ERS, the typology "captures differences in economic and social characteristics" in order to "provide policy-relevant information about diverse county conditions to policymakers, public officials, and researchers."[8] An advantage of the typology is that it distinguishes between the extractive industries which tend to dominate non-metropolitan counties. The county-types include farming, mining, manufacturing, government, services, and non-specialized economic dependence. The economic dependence categories are widely used and capture the industrial and post-industrial dichotomy asserted in previous research (e.g., McCall 2001) in addition to other detailed types that represent the breadth of economic dependency in the contemporary United States.

We also account for the influence of more general county economic conditions, including the proportion of the labor force that is unemployed, the proportion of the male working age population that is underemployed, and the proportion of the working-age population non-employed.[9] Indicators of the demographic structure include the proportion of households that are female-headed and the proportions of the population disabled, and age 65 or older since these populations have a limited earnings potential. We also include the foreign-born population to account for the potential spurious influence of immigration (with regard to racial/ethnic concentration). Finally, human capital is measured as the proportion of the county population age 25 and over that has no formal education beyond a high school diploma (or GED).

Each of the factors has been identified in previous research as theoretically relevant and statistically significant for poverty. We anticipate, however, that the generalized relationships between the factors and child poverty will vary systematically between regimes. Importantly, we pursue socially- and geographically-defined regimes to infuse sociological meaning into the otherwise purely spatial context. For example, the association between racial/ethnic concentration and child poverty may differ across economic dependence regimes since places with greater reliance on particular industries tend also to have larger or smaller concentrations of particular racial/ethnic groups. For example, counties with high agricultural production tend to have larger than average racial/ethnic

[8]More information is available on the ERS website (http://www.ers.usda.gov/Data/TypologyCodes/). In the case of our dissolved geographies, county typologies reflect the characteristic of the "parent" counties.

[9]Our measure of unemployment reflects the proportion of the adult (age 16 years or older) civilian population that is seeking work but is currently unemployed. Underemployment is measured as the proportion of the male adult population that worked fewer than 35 hours per week or was not working but seeking work in the last year. Non-employment is measured as the proportion of the population that is not in the labor force; the population is not seeking work because they are discouraged or unavailable. The referent group is the proportion employed, either full- or part-time, and not seeking more work. Each measure is temporally lagged to 1990 to address potential endogeneity in the relationship between past and current employment conditions with poverty. Findings are consistent when using employment measures from 2000.

minority populations (e.g., Kandel and Newman 2004; Kandel and Parrado 2005; see also Liaw, Frey, and Wiley 2007).

Technically, geographic variation in the mean level of an independent data-generating process (spatial heterogeneity) generally is addressed through the imposition of weak spatial stationarity to permit statistical inference (Cressie 1993). Spatial heterogeneity "follows from the intrinsic uniqueness of each location" (Anselin 1996:112) implying that variation in the mean intensity of a spatial process can be explained by a combination of an appropriate model specification for the process and a set of well-chosen covariates. Any unresolved heterogeneity generally is handled through the additional specification of dependencies operating across neighboring units of analysis either in the response variable, in independent variables or in the error term.

Following language established by Anselin (1988:100-118; 1992:163), we simultaneously employ a spatial regime and spatial error regression analysis to address the question of spatial variation in the associations between child poverty and its correlates while simultaneously treating spatial autocorrelation evidenced in the data. The spatial regime approach addresses large-scale differences and, in essence, is analogous to a fully interacted model—each of the variables is interacted with the variable that designates the different regimes. Yet it has the added benefit of testing for stability in the specific estimates as well as the overall model fit; the traditional interaction approach would produce the same results without the ease of interpretation and without tests for stability across the models. Spatial regime analysis is also a means of dealing with large-scale spatial heterogeneity and, thus, a means of ameliorating the error heteroskedasticity common to ecological regression analysis and of conceptual relevance in the current analysis.[10] The spatial error regression component of the analysis addresses spatial autocorrelation observed in the residuals (small-scale data dependence) not captured in the regime analysis that would otherwise bias model results. A first-order queen contiguity matrix is used for generating the spatial regression results, and the parameters were estimated using the SpaceStat software (Anselin 1992).[11]

We employ the traditional approach to analyzing the geographic context (spatial error regression) and then push beyond the strictly geographic sense of the "spatial" context (neighborhood contiguity) by permitting non-contiguous clusters identified by social (race/ethnic composition) and economic (industrial structure) to enter the analysis as regimes. Through this dual specification, the larger spatial context is addressed through the spatial error approach, whereas the importance of the theoretically relevant spatially bounded social and economic attributes is picked up in the regime approach.

We begin with a geographically-motivated approach in which we introduce and estimate a model that identifies variation in the correlates of child poverty between the South—a region historically known among scholars and policy makers for high and persistent poverty—and the non-South. Although useful in some instances, we conclude that a regionally focused

[10]This approach is distinct from an OLS regression with regional (or regime) dummy variables (see, for example, Ward and Gleditsch (2008:61-64). An OLS regression with dummy variables accounts for regional heterogeneity (large-scale spatial effects) and can be used as an alternative to a spatially lagged *y* (dependent variable) model. The main conceptual difference between an OLS with regional dummy variables and a spatial regime model is the difference between testing for fixed and random effects. The former permits intercepts to vary across regions whereas the latter allows both intercepts and slopes to vary across regions. In the current context, the spatial regime analysis permits the average child poverty and the magnitude of the structural correlates of child poverty to vary among regimes. Such relationship variation is another type of spatial heterogeneity (e.g., LeSage 1999:8).

[11]We also fit a spatial lag regression model. The spatial error approach was preferred given better model fit and comparable substantive findings across models, and because we do not have a theoretical argument to support the use of the spatial lag regression. Spatial lag can be interpreted as indicative of a diffusive process; what happens in one location spreads to neighboring locations. The first-order queen convention for the weights matrix was chosen based on conceptual understanding the political units sharing boundaries have some relationship with one another, whether social, economic and/or political.

child poverty analysis fails to satisfactorily address the more sociological, or social structural, storyline generating the spatial differentiation in child poverty. Rather than modeling child poverty within specific geographic sub-regions, we prefer models that give us the capacity to analyze child poverty across spatial units according to the sociologically-meaningful characteristics, namely local area racial/ethnic concentration and economic dependence. We use a spatial regime approach to test for differences in model fit as well as the strength of principal factors commonly associated with poverty. Coefficient estimates for parameters in the different regimes reveal variation the in structural underpinnings of child poverty for counties in different social regimes.

3. RESULTS

Figure 1 shows a map of the dependent variable, county child poverty (log odds or logit transformed). The map affirms a long-standing reality: child poverty is concentrated in specific geographic sub-regions of the United States, namely Appalachia, the Mississippi Delta and counties east of the Delta with historically predominant African-American populations, the borderlands, the Four Corners and Indian reservations throughout the Northern Plains. The map also reaffirms that the South is a region of more extensive and more intense poverty than found in other large regions of the country. Thus, we begin the combined spatial regime and spatial error regression analysis by considering the South and non-South (census-defined regions) as distinct spatial regimes.

3.1. Regional Regimes

Results from the South/non-South regime analysis are reported in Table 1. There are significant differences between southern counties compared to non-southern counties. For example, while there is a statistically significant negative association between the proportion of the African American population and child poverty rates in non-southern counties (due to the combined influence of other factors associated with child poverty, including the proportion of female-headed households), there is no evidence of a race effect in the South. In addition, economic conditions also have a weaker association with child poverty in the South relative to the non-South. The analysis provides evidence that the poverty process in the South is different from the process outside of the South—regional differences are indicated by the different parameter estimates and the reported spatial Chow test (Anselin 1990) for structural instability across regimes, reported in Table 1.[12]

While provocative, these results do not give the analyst an understanding of which substantive social characteristics of the South distinguish it from the non-South. For example, it is unlikely that race/ethnicity has no association with child poverty in the South (suggested by the results reported in Table 1) but it is more reasonable to conclude that the concentration of African Americans has a different implication in the South than in the non-South. Indeed, further analysis (results not reported) reveals that farming dependence suppresses the relationship between African American concentration and child poverty; the race parameter is statistically significant and positive in the South once farming is removed from the regression model suggesting, intuitively, a close link between race and farming in the region. We argue that we are better able to understand the spatial patterning of poverty by moving beyond geography, per se, and toward social factors that comprise the context of place, including racial/ethnic concentration and economic dependence.[13] This approach is consistent with research asserting local variation in inequality-generating processes. Our aim is to identify the social features of local areas that give rise to spatial differentiation.

[12]The Chow statistic is used to test for stability of the regression coefficients, jointly and separately, across the regimes and is distributed as an F statistic with K,N-MK degrees of freedom where M is the number of regimes (see Anselin (1990) for a discussion of the spatial Chow test). The null hypothesis is that the coefficients are the same in all regimes.

3.2. Social "Spatial" Regimes

Race/ethnicity is well established as a meaningful factor and is among the strongest and most compelling correlates of poverty in the United States at both the individual and aggregate levels (e.g., Iceland 2006; Saenz 1997; Snipp and Summers 1992). For the analysis of the mediating influence of racial/ethnic concentration, we create two regimes based on the empirical distribution: one represents high minority populated counties (those with 25% or more of the total population comprised of non-white and Hispanic residents); and the other represents low minority population counties (those where total population consists of fewer than 25% non-white and Hispanic residents). Figure 2 shows these two regimes along with (in outline) the counties with high poverty rates in 2000 (the upper quintile of poverty is highlighted in the figure). While not perfectly correlated, counties with high proportions of the population declaring Latino ethnicity or a race other than non-Hispanic white in the Census 2000 and high child poverty rate suggest a strong positive correlation. Indeed, the mean child poverty rate for high minority counties was 22% whereas the mean for low minority counties was 15% (the national average was 16%).

Economic dependence, a measure of industrial structure, is also commonly investigated in studies of place-level poverty. The updated county typologies from the ERS of the USDA are used here. The ERS categories are based on economic analysis including area earnings and employment dependence. The categories are useful because they permit a more parsimonious analysis than what is achieved by using percent employed across the different industries. Moreover, the categories suit the objectives of this research by identifying the type of local area economic dependence. The typology is not without limitations; chiefly, the service category mixes high quality (and paying) and low quality service industries.

Like child poverty, and like race/ethnicity, economic dependence is spatially patterned (see Figure 3). Economic dependence does not appear to correlate as readily with child poverty as racial/ethnic concentration does, yet a notable pattern emerges. Mining (23% average poverty rate), farming (21%), and federal/state government (20%) dependent counties are more greatly represented among counties with the highest levels of child poverty (highlighted in Figure 3) relative to non-specialized (19%), manufacturing (17%) and services dependent (14%) counties.[14]

The remainder of our analysis of child poverty focuses on these two factors—racial/ethnic concentration and economic dependence. We examine the spatial regime results with corrections for residual spatial autocorrelation where racial/ethnic concentration and economic dependence are jointly considered to create social "spatial" regimes. This approach permits us to address what it is about a place that distinguishes it from other places, in terms of child poverty.

3.2.I. Racial/Ethnic Concentration—Beginning with racial/ethnic concentration, evidence of structural variation is found for both the model fit and the separate correlates of poverty (see Table 2). Our findings show that some economic and demographic factors do more to shape child poverty in places with high concentrations of minority groups while others have a stronger association in places with low minority concentrations.

[13]The statistically significant positive coefficient found for the spatial error term does not have a substantively meaningful interpretation; it reflects the spatial autocorrelation in the residuals. We can interpret the substantively-motivated estimates with confidence once purging the residuals of autocorrelation.

[14]Service-dependent counties are those that have a high proportion of their income derived from service-related jobs including consumer services, distributive and business services, wholesale and retail trade, and education (Cook and Mizer 1994).

Unemployment, male underemployment, and non-employment are significantly associated with child poverty in both high and low minority counties since these factors capture limited potential household earnings. However, unemployment is more strongly related to child poverty in low minority counties whereas non-employment has a significantly stronger association in high minority counties. Unemployment and non-employment reflect two distinct labor market challenges. Unemployment signals limited job availability whereas non-employment signals the opting out of the labor force, perhaps due to discouragement caused by unsuccessful job searches. Results show opting out of the labor force is especially problematic in high minority counties.

Farming dependent counties are more likely to have higher rates of child poverty than non-specialized counties (the reference category), and the relationship is stronger among high minority populated counties. Similar findings emerge for the proportion disabled; no association with child poverty is found among low minority populated counties whereas a positive and statistically significant association with child poverty is observed for high minority counties. Similarly, the proportion foreign-born has a stronger association with child poverty among counties with high minority populations.

Farming dependent counties are among the places with a historical legacy of racial inequality (Saenz 1997; Snipp 1996; Swanson et al. 1994); the industry tends to be distinctly exploitative (i.e., plantations and haciendas) in places with high minority concentrations. High concentrations of non-white populations are dominant in the southern counties of the United States extending along the eastern seaboard in addition to pockets in the Pacific Northwest and Northern Plains. Disability is correlated with farming dependence given the higher frequency of accidents (Leigh and Fries 1992) and the lower prevalence of health insurance coverage (Markowitz, Gold, and Rice 1991; Marsteller et al. 1998; see also Leigh, McCurdy, and Schenker (2001) for an analysis of the costs of farm injuries). Disability can directly affect child poverty by limiting the productivity and earning capacity of the adult population on which children are dependent.

3.2.II. Industrial Structure—Evidence is also found for variation in the structural correlates of poverty according to county economic dependence (Table 3). Farming dependent counties are the most distinct from the other economic regimes. Consistent with the racial/ethnic regime analysis, race/ethnicity has a notably larger association with child poverty in farming dependent counties relative to all other county types. Farm dependent counties are predominantly located in the Great Plains (high American Indian and Hispanic concentrations) with some presence in the West and parts of the South (high American Indian, Hispanic and African American concentrations).

Demographic factors, however, have weaker associations with child poverty in farming dependent counties relative to other county types. The proportion of female-headed households is only weakly associated with child poverty in farm-dependent counties, although it is strongly correlated with child poverty in areas defined by all other economic types. In general, female-headed households have a lower earnings potential since there is one adult earner versus the potential for two earners as in married-couple households. Results demonstrate that single-earner status is a weaker contributor to child poverty in farming-dependent counties relative to counties dependent on other industries.

Although not a significant factor in farming dependent counties, the proportion of the population reporting disability is especially correlated with child poverty among mining and manufacturing dependent counties. Mining dependent counties are largely found in the western part of the nation, especially in Texas, Nevada and among front-range counties of the Rocky Mountains, in addition to Appalachia, the southern coast of Louisiana, and where

the Illinois, Indiana and Kentucky borders intersect. Manufacturing dominates most of the eastern US, the South and the North. Our findings demonstrate that disability, perhaps related to employment in these more physically demanding and risky industries, is more of an issue for child poverty in these areas than in other parts of the nation.

Unemployment is most strongly linked to child poverty in government dependent counties. Government dependent counties are located throughout the United States, with some concentration in the western and southern regions. Further, while non-employment is significantly associated with child poverty in nearly all economic types, it is not linked to poverty in government dependent counties (or farming depending counties). Underemployment, however, is associated with child poverty in these counties, and all other economic types except mining.

4. DISCUSSION

Child poverty is not homogeneous across the United States, but it is shaped by local-area social context. This finding complicates the utility of standard nation-level estimates and suggests that inconsistencies in previous findings can be understood as variation in the relationships between structural factors and poverty. Results show that national analyses of child poverty, and very likely other types of poverty and socioeconomic conditions, need to be sensitive to the confluence of local circumstances. Researchers must engage in spatial thinking or risk reporting empirically incorrect results and drawing erroneous theoretical conclusions.

This research contributes to the study of spatial inequality by articulating the social forces that shape spatial patterns. While research within this vein has focused on how distinct places emerge through uneven development processes, our study explicates how the qualities of distinct places contribute to the emergence (or the perpetuation) of child poverty. Rather than merely concluding, for example, that the South is different from the non-South, our strategy empirically identifies the social factors underlying the regional difference. Most structural factors vary according to the local-area racial/ethnic and economic contexts. That is, racial/ethnic concentration and industrial structure set the context for different processes that generate child poverty. What is more, we find that the significance of these central factors varies according to the other.

Tests for structural differences in the separate correlates of child poverty reveal that economic dependence, employment, disability, and immigration have distinct relationships to child poverty depending on the racial/ethnic concentration of the county. Similarly, race/ethnicity, employment, family structure, disability, and aging dramatically vary in their association with child poverty across the economic regimes. These factors are of primary focus in national studies of poverty. Results suggest that while important, the relative magnitude of their significance differs systematically across places according to local-area economic structure. The constancy assumption is not supported; point estimates that summarize the relationship between child poverty and its predictors mask important variation in the associations among US counties. We find that relationship variation can be understood in social and spatial terms, where the social factors give meaning to the spatial differentiation.

The only factor that did not vary in its relationship to child poverty across the racial/ethnic, economic or even strictly spatial regimes was education. Counties with higher proportions of low educated residents consistently report higher child poverty rates. This finding shows that places with a low-educated population are at a disadvantage perhaps due to the types of (low-paying) jobs available to a low-skill workforce, regardless of an area's dominant

industry or racial/ethnic composition. The role of all other factors examined, however, is modified by local-area racial/ethnic concentration and industrial structure.

This study is the first step toward a research agenda that aims to better understand the local-level processes that shape child poverty and other forms of inequality. Results inform theoretical models that aim to characterize the processes that generate economic and social inequality. We demonstrate that the confluence of social factors bounded in a physical space work together to shape local-area child poverty. Not only is child poverty spatially differentiated across the United States, but the relationships that give rise to the pattern are also spatially differentiated.

Research on the racial/ethnic dynamics of inequality would be improved by explicitly treating race/ethnicity as a conditioning contextual factor as opposed to an additive factor. Doing so clarifies that race/ethnicity is not a cause of poverty and gives emphasis to the racial/ethnic context in which the causes of poverty operate. For example, unemployment and non-employment are stronger contributors to child poverty in high minority counties suggesting that investments in economic development may do more to ameliorate child poverty in these places.

Moreover, theoretical models that focus on economic mechanisms would be enhanced by articulating the conditioning influence of local area industry. Industry clearly matters, but how it matters is through its influence on more proximate determinants of poverty including employment. The ability of an individual to secure a job or to engage in the labor force differs across industries. To understand the aggregate-level outcome, it is appropriate to empirically account for the differences across industries.

Further investigation of the identified regime typologies promises to have policy implications to address the social injustice of child poverty. Our findings suggest that no single policy will work across all contexts given local variation in the complex intersection of the various dimensions that promote child poverty. Prior studies centering on the sub-national spatial context have argued that it is at the local level that social movements must take root to change inequality dynamics (McCall 2001). We assert that local areas are diverse, yet they are not unique. In our analysis, we set out to identify the source of diversity to better understand local variation. Change in the dynamics can be designed and delivered at the local area, but the design and delivery are based on an understanding of the general features that set one local area apart from some areas and put it in line with others. McCall writes, “different paths of economic development have different consequences for the level and structure of inequality” (2001:58). It is the paths, not the geography that drive the spatial pattern of inequality.

Working from this view, our findings have several potential policy implications. For example, wage and benefit determination may have the greatest impact on reducing child poverty among high minority communities. Additionally, increasing job opportunities would be a reasonable focus in places dependent on mining, manufacturing and government employment, especially given the recent economic downturn. Further, improved support for disabled populations might have the most dramatic impact on ameliorating child poverty in mining- and manufacturing-dependent counties.

Consistent with previous research examining spatial patterns of poverty (Friedman and Lichter 1998; Levernier, Partridge, and Rickman 2000), our findings illustrate the need for community-level intervention that is differently prescribed according to different local-area needs. Moving beyond earlier studies, ours identifies how social forces intersect in different ways—ways that are modified by the uniqueness and systematic patterning of place characteristics—to produce the observed patterns of spatial inequality.

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HIGHLIGHTS

> We build on research showing sub-regions have different processes that abet poverty. > We use spatial regression to examine differentiation in relationships generating child poverty. > Factors contributing to child poverty differ according to racial/ethnic and economic contexts. > Local-area processes have implications for theoretical models and anti-poverty policies.

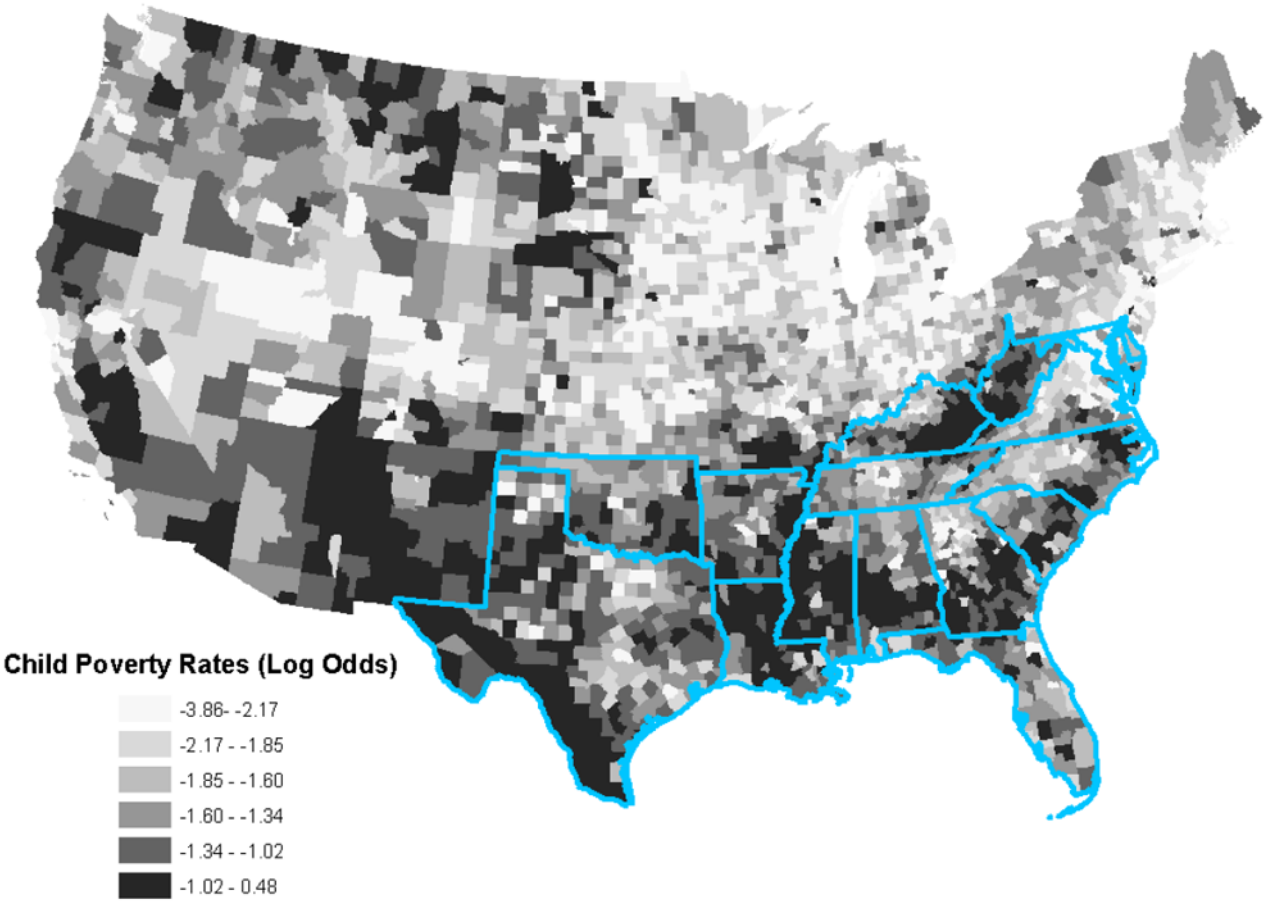

Figure 1.
Log Odds of Proportion of Children in Poverty: 2000, U.S. Counties (excluding Alaska and Hawaii). States in U.S. South outlined.

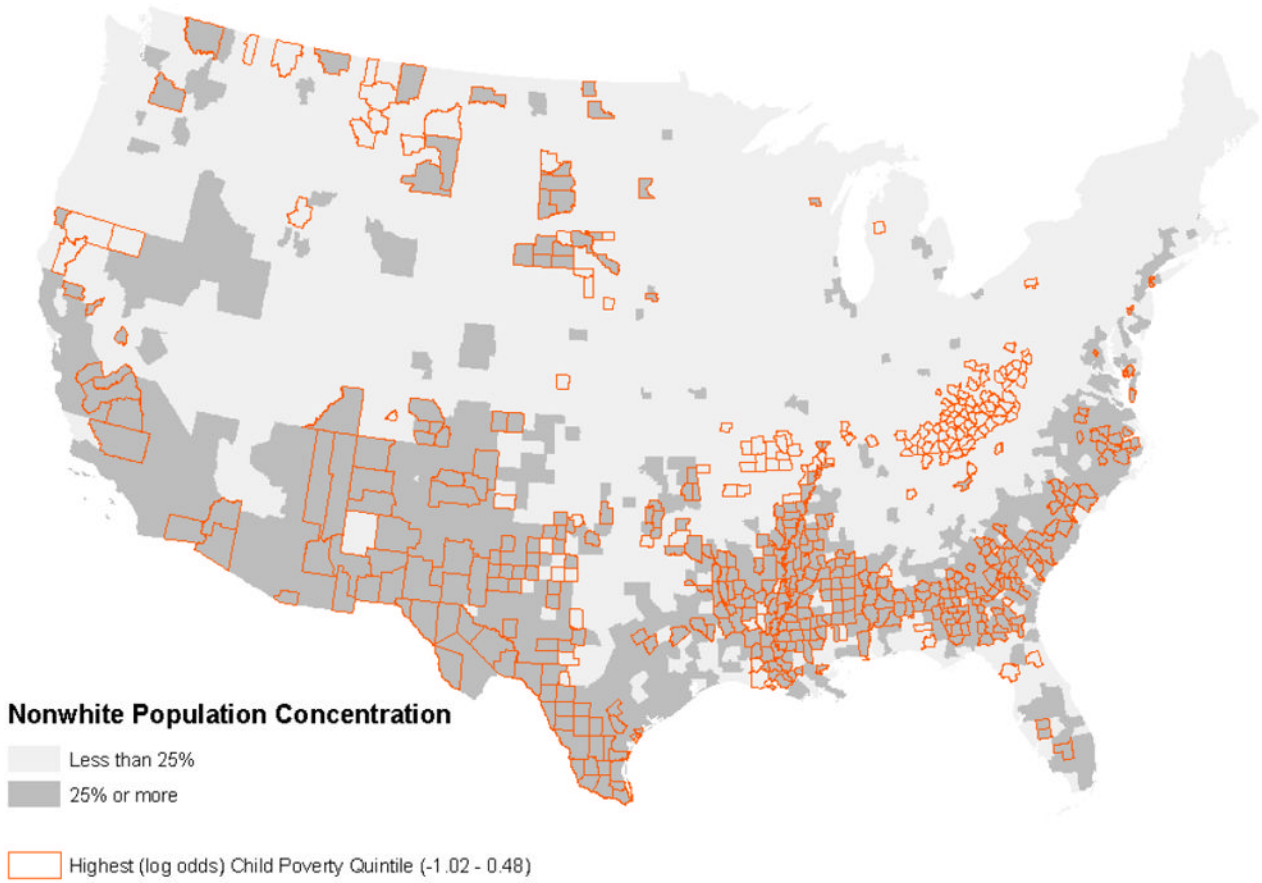

Figure 2.
Racial Concentration Regimes based on Percent Non-white and Counties with High Child Poverty in 2000.

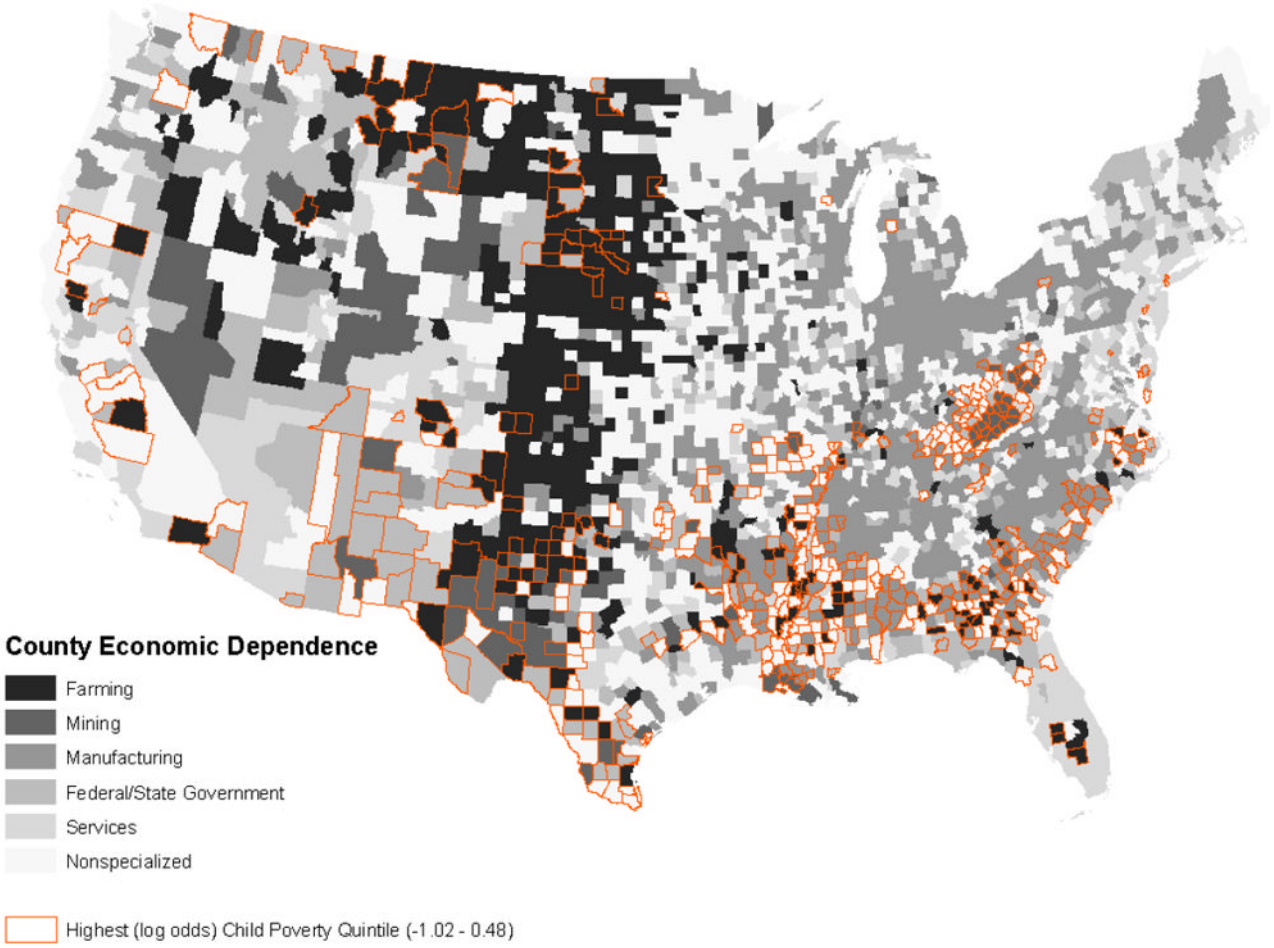

Figure 3.
Industrial Structure Regimes based on Economic Dependence and Counties with High Child Poverty in 2000.

Table 1

Unstandardized Regression Coefficients from a Spatially Corrected Spatial Regime Analysis Testing for Structural Variation in the Predictors of Child Poverty Rates (log odds) for Southern and Non-Southern Counties (N=3,071)

	South (N=1,387)		Non-South (N=1,684)		Structural Differences in Correlates
	β	SE	β	SE	
Racial/Ethnic Concentration					
Proportion African American	-0.18	0.12	0.63 **	0.24	9.30 **
Proportion Native American	0.49	0.33	0.60 ***	0.13	0.09
Proportion Hispanic	0.52 ***	0.14	0.46 **	0.15	0.07
Economic Conditions†					
Farming Dependent	0.12 ***	0.03	0.26 ***	0.02	13.93 ***
Mining Dependent	0.04	0.04	-0.01	0.04	0.95
Manufacturing Dependent	-0.01	0.02	-0.09 ***	0.02	8.64 **
Federal/State Government Dependent	-0.03	0.02	-0.02	0.03	0.05
Services Dependent	-0.07 *	0.03	-0.07 **	0.02	0.00
Proportion Unemployed (1990)	1.25 **	0.43	1.35 **	0.43	0.03
Proportion Male Underemployed (1990)	0.97 ***	0.21	1.58 ***	0.19	4.76 *
Proportion Not in Labor Force (1990)	1.65 ***	0.25	0.99 ***	0.24	3.52
Demographic Structure					
Proportion Female-Headed Households	4.01 ***	0.26	3.75 ***	0.24	0.55
Proportion Disabled	1.43 ***	0.30	1.17 ***	0.31	0.34
Proportion Age 65 & Older	-0.11	0.33	0.53	0.32	2.00
Proportion Foreign-Born	1.14 ***	0.31	1.18 ***	0.29	0.01
Human Capital					
Proportion High School Educated or Less	1.10 ***	0.14	1.29 ***	0.13	0.98
Constant	-4.33 ***	0.08	-4.46 ***	0.08	1.34
Spatial Error Parameter (λ)	0.59 ***	0.02			
Chow Test for Structural Instability across Regimes	78.18 ***				

	South (N=1,387)		Non-South (N=1,684)		Structural Differences in Correlates
	β	SE	β	SE	
Likelihood Ratio Test for Spatial Error	468.01 ***				
-2 Log Likelihood	-313.58				

* p < .05,

** p < .01,

*** p < .001

† Nonspecialized economic dependence is the reference category.

Table 2

Unstandardized Regression Coefficients from a Spatially Corrected Spatial Regime Analysis Testing for Structural Variation in the Predictors of Child Poverty Rates (log odds) for High (25% or more) and Low (less than 25%) Minority Populated Counties (N=3,071)

	High Non-White Populated (N=876)		Low Non-White Populated (N=2,195)		Structural Differences in Correlates
	β	SE	β	SE	
Economic Conditions†					
Farming Dependent	0.24 ***	0.02	0.15 ***	0.03	5.65 *
Mining Dependent	0.03	0.03	-0.05	0.05	1.73
Manufacturing Dependent	-0.06 ***	0.02	-0.03	0.03	0.87
Federal/State Government Dependent	-0.04	0.02	-0.03	0.03	0.06
Services Dependent	-0.06 **	0.02	-0.07	0.04	0.01
Proportion Unemployed (1990)	0.80 *	0.38	3.01 ***	0.44	14.62 ***
Proportion Male Underemployed (1990)	1.57 ***	0.17	1.06 ***	0.24	2.99
Proportion Non-employed (1990)	1.66 ***	0.22	0.64 *	0.28	8.25 **
Demographic Structure					
Proportion Female-Headed Households	3.92 ***	0.19	3.48 ***	0.18	2.82
Proportion Disabled	1.85 ***	0.26	0.31	0.36	12.11 ***
Proportion Age 65 & Older	-0.47	0.26	0.67	0.40	5.80 *
Proportion Foreign-Born	2.33 ***	0.37	1.07 ***	0.20	8.96 **
Human Capital					
Proportion High School Educated or Less	1.35 ***	0.11	1.29 ***	0.16	0.11
Constant	-4.73 ***	0.07	-3.74 ***	0.11	62.32 ***
Spatial Error Parameter (λ)	0.60 ***	0.02			
Chow Test for Structural Instability across Regimes	114.50 ***				
Likelihood Ratio Test for Spatial Error	596.31 ***				
-2 Log Likelihood	-316.89				

* p < .05

** p < .01

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*** $p < .001$

†Nonspecialized economic dependence is the reference category.

Table 3

Unstandardized Regression Coefficients from a Spatially Corrected Spatial Regime Analysis Testing for Structural Variation in the Predictors of Child Poverty Rates (log odds) by Economic Dependence Typologies (N=3,071)

	Farming (N=440)		Mining (N=125)		Manufacturing (N=885)		Federal/State Government (N=356)		Services (N=331)		Nonspecialized (N=934)		Structural Differences in Correlates
Racial/Ethnic Concentration													
Proportion African American	1.46 ***	0.26	-0.24	0.51	-0.15	0.16	-0.28	0.21	-0.42	0.28	-0.25	0.15	39.04 ***
Proportion Native American	2.36 ***	0.24	0.72	0.46	0.24	0.41	0.06	0.21	1.17	0.69	0.08	0.21	65.70 ***
Proportion Hispanic	0.87 ***	0.23	0.03	0.28	0.67	0.45	0.52 **	0.18	0.05	0.36	0.23	0.17	8.71
Economic Conditions													
Proportion Unemployed (1990)	-1.49 *	0.72	-1.41	1.36	1.05	0.66	3.87 ***	0.65	1.35	1.10	0.79	0.53	34.84 ***
Proportion Male Underemployed (1990)	1.23 ***	0.35	1.11	0.76	1.08 ***	0.32	1.19 ***	0.25	1.10 *	0.51	1.69 ***	0.28	2.80
Proportion Non-employed (1990)	0.50	0.34	2.78 ***	0.68	2.47 ***	0.40	0.40	0.37	2.08 ***	0.60	2.05 ***	0.36	29.85 ***
Demographic Structure													
Proportion Female-Headed Households	0.91 *	0.42	5.60 ***	1.07	4.24 ***	0.34	3.78 ***	0.43	5.83 ***	0.47	4.43 ***	0.30	74.46 ***
Proportion Disabled	-0.09	0.40	2.78 ***	0.77	3.17 ***	0.42	1.16 *	0.58	-0.12	0.86	1.53 ***	0.37	38.49 ***
Proportion Age 65 & Older	0.23	0.45	-2.04 *	0.95	-1.60 **	0.51	1.11	0.59	-1.34	0.69	-0.39	0.40	18.76 **
Proportion Foreign-Born	1.02	0.52	2.18	1.14	1.53 *	0.72	0.71	0.49	0.88 *	0.41	2.03 ***	0.41	6.66
Human Capital													
Proportion High School Educated or Less	1.25 ***	0.26	0.94	0.50	0.93 ***	0.18	1.00 ***	0.24	1.32 ***	0.31	1.62 ***	0.17	9.69
Constant	-2.93 ***	0.16	-4.78 ***	0.33	-4.99 ***	0.13	-4.10 ***	0.13	-4.68 ***	0.12	-5.07 ***	0.10	151.47 ***
Spatial Error Parameter (λ)	0.52 ***	0.02											
Chow Test for Structural Instability across Regimes	764.46 ***												
Likelihood Ratio Test for Spatial Error	521.98 ***												
-2 Log Likelihood	-112.77												

* p < .05

** p < .01

*** p < .001