

Title: Metropolitanization, population redistribution, and the changing geography of poverty in the United States

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Running Head: Poverty & Metropolitanization

Abstract

There have been drastic changes in the distribution of the U.S. population between rural and urban areas over recent decades. This metropolitanization process—wherein larger proportions of the population come to live in metropolitan areas is driven by redistribution of the population between counties and the reclassification of counties as metropolitan (or nonmetropolitan) over time. Running parallel to the metropolitanization process, there have been substantial shifts in the level and spatial distribution of poverty between and within the nonmetropolitan and metropolitan United States. However, inferences about rural-urban poverty dynamics are potentially influenced by the changing universe of counties. In this study, we examine the relationship between population redistribution, metropolitanization, and poverty. We analyze if there has been a diverging distribution and concentration of the poor and non-poor population in metropolitan and non-metropolitan areas, as well as along the metropolitan hierarchy. We argue that the metropolitanization process affects not only the distribution of the national population but also the proportion of people living in high poverty counties. Results indicate that if population redistribution had been held constant since 1970, the average county poverty rate would be lower in both metropolitan and nonmetropolitan areas. This provides evidence for a positive selection process, whereby the nonmetro counties that experience metropolitanization have low average poverty rates. The overall percentage of the national population living in high poverty counties has also decreased over time, but this is accompanied by increased exposure to high poverty in metro counties. Finally, we estimate that if the metropolitanization process had not occurred, then little changes in relative distribution of the total population between metropolitan and nonmetropolitan areas would have occurred. However there still would have been a significant shift in the distribution of the poor population from nonmetro to metro areas.

Keywords: Metro, Nonmetro, Population Redistribution, Population Geography, Poverty

Introduction

Metropolitan areas in the United States have experienced considerable growth since 1970, with an increasing proportion of the population living in metropolitan counties than nonmetropolitan counties (Fuguitt et al. 1988; Johnson et al. 2005; Johnson and Fuguitt 2000; Johnson and Winkler 2015; Lichter and Brown 2011; Lichter and Ziliak 2017). Parallel to this process of population redistribution and reclassification, also known as metropolitanization, demographers and other social scientists have documented changes in socioeconomic and epidemiological conditions in rural and urban areas—such as brain drain, heightened mortality, persistent poverty—which together have generated a persistent rural disadvantage and out-migration. (Fenelon 2013; Johnson and Lichter 2019; Johnson and Winkler 2015; Weber and Miller 2017). However, rural out-migration and socioeconomic issues are not the only processes contributing to the significant decline in America’s rural population relative to the urban population, and not all population growth for urban America has come directly as losses from rural America. Metro areas are major gateways for immigration populations (B. A. Lee and Sharp 2017; Lichter 2012; Massey and Capoferro 2008), and these areas have experienced considerable growth due to immigration, with the size of foreign born population more than tripling since 1970 (Grieco 2014). Moreover, most Americans now live in suburbs (Boustan and Shertzer 2013). Suburbanization, and its accompanying urban sprawl, has led to a blurring of the line of what is urban and what is rural (Lichter and Brown 2011; Lichter and Ziliak 2017). There are complex and varying pathways through which the metropolitanization process occurs, and the classification of “rural” versus “urban” has important implications for measuring and understanding population redistribution in these areas. Thus, careful “monitoring [of] the metropolitanization process” (Fuguitt et al. 1988) can provide insight into changing social and economic conditions between and within rural and urban areas, as well as how the classification schemes imposed by researchers and government entities can impact key measures of societal disadvantage and inequality.

There are three mechanisms through which metropolitanization and its subsequent population redistribution occurs—one national process and two local processes. Metropolitanization at the national level occurs through the uneven distribution of population growth, where metro counties experience growth

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while nonmetro counties experience limited growth or decline. At the local level, there are the processes of emergence and absorption. Metropolitan emergence occurs as nonmetro counties flip to metro due to population growth. Absorption occurs as nonmetro fringe/adjacent nonmetropolitan counties are absorbed into nearby or adjacent already-existing metro areas. Under these two mechanisms, the metro share of the U.S. population increases due to nonmetro counties “flipping” to metro via emergence or absorption.

The purpose of this study is to understand the role that metropolitanization and its underlying population redistribution and county reclassification played in the substantial growth and decline of county-level poverty in United States. Changes in the spatial and regional patterns of poverty have seemingly paralleled the metropolitanization process (Iceland and Hernandez 2017; Lichter and Johnson 2007; Thiede et al. 2018; Wang et al. 2012). Changes in county-level poverty are both the driver of and result of population growth and redistribution—suggesting the importance of studying the two together (Gundersen and Ziliak 2005; Partridge et al. 2008a). In this study we address the changing geography of the overall population and the poor population through the lens of the metropolitanization process. There has been a plethora of research on individual segments of the changing geography of the U.S.’s population (Curtis White 2008; Johnson et al. 2005; Johnson and Winkler 2015; Plane et al. 2005; Thiede et al. 2018). However, studies on the changing distribution of the poor and the total population together are limited. Research is needed that compares how the two populations have been redistributed between metro and nonmetro areas over time, and how the metropolitanization has affected the differences in the poverty rates between metro and nonmetro.

Since the 1970s, there have been changes in each county’s poverty rate and population share— affecting our understanding of poverty. Although these two changes are highly related, disentangling the two processes provides answers to the research questions proposed by this study. We study the relationship between poverty and metropolitanization by analyzing the following: what if population redistribution, county classification, and poverty rates had remained constant? Understanding the relationship between counterfactual population distribution and poverty rates provides insights into how metro and nonmetro

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poverty rates, exposure to high poverty, and the changing distribution of the total and poor populations are rooted in the metropolitanization process.

Background

The spatial redistribution of poverty in metro and nonmetro areas has occurred concurrently with the spatial redistribution of the U.S. total population (Johnson and Lichter 2019; Lichter and Johnson 2007; Lichter and Schafft 2017; Thiede et al. 2018; Weber and Miller 2017). Although poverty rates in metro and nonmetro areas have converged since the late 1970s, nonmetro poverty has remained consistently higher than metro poverty. The factors contributing to this long-term nonmetro disadvantage are well documented and include the following: dependence on agriculture and natural resources, loss of manufacturing jobs, and local political-economies that have left large segments of the population at a permeant disadvantage (Curtis et al. 2015; Fisher 2007; Lichter and Roempke Graefe 2011; Thiede and Monnat 2016; Wang et al. 2012; Weber and Miller 2017). Not only has nonmetro poverty persisted over time; it has become increasingly concentrated (Lichter et al. 2007; Lichter and Schafft 2017; Thiede et al. 2018).

Many proposed policy solutions and local community economic development practices suggest that demographic growth is key to improving the conditions in nonmetro areas and decreasing the gap between metro and nonmetro areas (Goetz et al. 2018; Johnson and Beale 2002; Kulcsár and Bolender 2011; Partridge et al. 2008b). This provokes the question: has nonmetro poverty remained high because more economically successful counties experience population growth and, as a result, become metro?

A particularly important component of the changing nature of poverty is that poverty has become spatially concentrated in certain parts of the country, specifically in certain nonmetro regions (Iceland and Hernandez 2017). Traditionally the smallest and most remote of nonmetro counties have had the highest county-level poverty rates (Duncan and Lamborghini 1994; Thiede et al. 2017). In recent decades, nonmetro counties with larger populations, often called micropolitan counties, have poverty rates (Thiede et al. 2018).

Another way to examine the spatial concentration of poverty is to examine the changing exposure to high poverty. Exposure to high poverty represents the percent of the total population that is living in counties with extremely high poverty (Lichter and Johnson 2007). Exposure to high poverty has a variety

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of negative effects for the residents of these counties (Brooks-Gunn et al. 1993; M. R. Lee 2000; Massey 1996; Sharkey and Faber 2014; Wen et al. 2003; Wodtke 2013; Wodtke et al. 2011). These negative outcomes include increased mortality, lower childhood education outcomes, exposure to crime, and limited intergenerational mobility (Chetty et al. 2014; Rigg and Monnat 2015; Singh and Siahpush 2014; Wodtke 2013; Wodtke et al. 2011). Exposure to high poverty is correlated with the concentration of racial minorities, and a disproportionate share of high poverty counties are located in rural areas of the South with a high percentage black population – the so-called Southern black belt – which includes counties of the Mississippi delta (Thiede et al. 2018). Changing exposure to high poverty is also interwoven with other demographic forces present in the United States. For instance, nonmetro high poverty places are also affected by aging in place and adverse that limit upward mobility for many poor residents (Duncan 2015; Johnson and Lichter 2019; Li et al. 2018; Weber et al. 2018).

With regards to metro areas, most research on exposure to high poverty in urban areas is at the neighborhood level (Pattillo and Robinson 2017). Metropolitan level of exposure to high poverty is also important due to the high concentration of vulnerable immigrant populations in the nation’s largest cities (B. A. Lee and Sharp 2017; Lichter 2013; Martin et al. 2016). Racial segregation within metropolitan areas also affects exposure (Iceland and Hernandez 2017; Quillian 2012). Although the manifestations and consequences of exposure to high poverty vary between metro and nonmetro places, the underlying forces generating and maintaining high poverty in the United States are likely linked to the changing spatial distribution of the population, both poor and non-poor, across the rural-urban continuum.

Conceptual Approach and Research Questions

We approach our study from three directions. First, the long-term redistribution and growth patterns of both the total population and poor population in a given area potentially differ from one another. Moreover, the redistribution of these populations likely play out differently at varying levels of metropolitanization (Kneebone and Berube 2008; Population Reference Bureau 2007; Thiede et al. 2018). Past work has shown that the economic activity, industrial patterns, and ethno-racial composition differ between different sized counties—even within the larger metro and nonmetro categories—and these

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differences affect longitudinal population and poverty change (Crowley et al. 2015; Curtis et al. 2015; Frey 2014; O’Connell and Shoff 2014). Further, increases in poverty have both limited, or been the result of, population growth (Johnson and Lichter 2016; Nord et al. 2010; Weber and Miller 2017). The changes in poverty associated with metropolitanization may differ for different sized metros and non-metro areas. Therefore, we ask the following research question:

“How has metropolitanization influenced the gap in poverty rates between metro and nonmetro areas over time, and how have poverty rates varied over time between counties that have experienced metropolitanization and those who have not?”

Second, population redistribution has affected exposure to high levels of poverty (Iceland and Hernandez 2017; Thiede et al. 2018; Wilson 2012). Although much of the change in exposure over time is due to increased or decreases in county-level poverty rates, it is important to analyze how redistribution of the population has affected exposure to poverty. This redistribution both affects the number of counties that are experiencing high poverty at a given time, as well as who is exposed to high poverty. It is likely that the migration and distribution patterns of the total population and poor population have led to changing levels of exposure to high poverty. Exposure has also likely changed over time in unique ways for those who live in metro and nonmetro areas. We formally ask this research question as:

“How has exposure to high poverty changed over time, and how has metropolitanization influenced this exposure?”

Lastly, research has indicated that migration patterns among the poor and the non-poor vary (Cooke 2010; Foulkes and Schafft 2010; Nord 1998; Nord et al. 2010). These migration patterns and the changing poverty rates at the county-level have resulted in the total population and the poor population being concentrated in different parts of the country. For example, even though nonmetro America has experienced a decline in population share relative to metro America (Johnson and Lichter 2019), the share of the poor population living in nonmetro counties may have decreased at a substantially different rate than the share of the total population. These long-term shifts in the share of a given population from nonmetro and metro counties are rooted in the metropolitanization process. We explore whether and how the metropolitanization

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process has contributed to the redistribution of the total population and the poor population at different rates, and if there is an emerging bifurcated distribution of the two groups in metro and nonmetro counties. These potential scenarios are important for better understanding how the nation's population geography has changed in the past and how it could change in the future. As such, our third research question is the following:

“How has the population distribution of the total and poor populations changed over time, and how has metropolitanization influenced this distribution?”

Methods

Data

Data for this analysis are sourced from the 1970, 1980, 1990, and 2000 decennial censuses and the 2006-2010 and 2013-2017 American Community Survey (ACS) 5-year estimates. These data are retrieved from the Integrated Public Use Microdata Series' NHGIS (Manson et al. 2018). Variables in the dataset include county-level estimates of the poor and total population.

For this study poor persons are classified as those living below the poverty level using the Census Bureau's Official Poverty Measure (OPM). A household—thus the members within a household—are considered poor if the total household income falls below an absolute threshold that is adjusted for household size and the age composition of members (Citro and Michael 1995; Iceland 2005). The OPM has received criticism for its measurement of income (Dhongde and Haveman 2017; Hutto; Nathan et al. 2011; Segal and Peck 2006; Wimer et al. 2016), and the OPM can be problematic for analysis of nonmetro poverty due to cost of living issues (Jensen and Ely 2017). For this study, however, the OPM represents the most consistent option to differentiate between the poor and non-poor populations at the county-level over the 50-year period.¹

County-level data has been harmonized across decades to account for county boundary changes by merging units which changed into larger time-consistent geographic areas. Alaska and Hawaii were

¹ The Supplemental Poverty Measure (SPM) is sometimes used instead of the official poverty measure. However, Census Bureau does not provide SPM estimates at the county level, and SPM data are only available starting in 2009.

excluded from this analysis. Our analytical sample is 3,098 counties and county equivalents for each of the six time periods in the study.

Metropolitan Hierarchy

Prior research has frequently viewed the distinction between metro and nonmetro, or urban and rural, as a simple dichotomy (Isserman 2005, 2007; Tong and Plane 2014; Wang et al. 2012). Although this approach has frequently been criticized due to its oversimplification of heterogeneous units, the predominance of the urban-rural dichotomy persists in research.² Some studies have extended beyond this binary classification, but these studies did not examine the transition of counties between different categories of metropolitan classification (Porter and Howell 2016; Tong and Plane 2014; Wang et al. 2012). Thus the examination of population redistribution along a more differentiated spectrum of metro-nonmetro county types represents a unique contribution of our analysis to the body of literature.

This study extends beyond the metropolitan-nonmetropolitan dichotomy by classifying counties on a metropolitan hierarchy used by Plane, Henrie, and Perry (2005) to measure other forms of population redistribution. The metropolitan hierarchy is an alternative county classification scheme that categorizes counties with the larger metro and nonmetro dichotomy into detailed groups based on their population size.

Accordingly, we produce a five strata metropolitan hierarchy to address this research gap. To classify counties into the metropolitan hierarchy, we use a modified version of the rural-urban continuum codes (RUCC) from the USDA Economic Research Service. The RUCC classifies counties based on metropolitan status, population size, and adjacency to metropolitan areas. Since the population thresholds used to delineate the RUCC have changed slightly over the decades, we collapse certain in order to produce a new classification scheme that is consistent across all decades. This study's metropolitan hierarchy is as follows:

1. Large metro: Metro population more than 1 million

² In this study we have made an effort to not conflate or use interchangeably the terms rural and urban, with nonmetropolitan and metropolitan, respectively. As study of county level change, we have elected to use terms that best categorize counties. See Isserman (2005) for an overview of this debate.

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2. Medium metro: Metro population between 250,000 and 1 million
3. Small metro: Metro population between 50,000 and 249,999
4. Micropolitan: Urban population between 2,500 and 49,999
5. Non-CBSA (core based statistical area): Urban population less than 2,500

A metro population refers to the summed population of all counties within a single metropolitan area. For example in 2017, the Pittsburgh metropolitan area contains seven counties, which have a total population of 2.3 million. Each of the seven counties is classified as a large metro for 2017. An urban population refers to the population of county that lives in an urban area—i.e. a city. Micropolitan counties and non-CBSA counties are differentiated from each other in that micropolitan counties contain a city that has a population of over 2,500 while non-CBSA counties do not. It should be noted that due to data constraints and the desire to create a consistent hierarchy across all decades, a conscious decision was made to not align our operationalization of micropolitan counties with the census definition, where micropolitan counties are defined as containing an urban area with a population between 10,000 and 50,000 (Brown et al. 2004).³ Due to data constraints and the desire to create a single hierarchy that is applicable for all decades, we have produced this substitute classification of micropolitan. This analysis focuses on metropolitanization between all five groups in the metropolitan hierarchy as well as change between metro (groups 1-3) and nonmetro areas (groups 4-5).

This five category classification system strengthens the analysis in two primary ways. First, the hierarchy assembles counties into more detailed and differentiated types of metro and nonmetro counties. These new groupings better reflect socioeconomic patterns that affect the distribution and concentration of the population in meaningful ways. Second, this hierarchy allows counties to move up and down the metropolitan ladder, per se, multiple times which allows for the analysis of what types of counties are undergoing the metropolitanization process from decade to decade.

Analytic Strategy

³ Micropolitan counties were only officially designated by the Census Bureau starting after the 2000 census, which explains this inconsistency within the RUCC codes.

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Using the metropolitan hierarchy, we address our three research questions using trend analysis, counterfactual standardization, and decomposition. These methods provide hypothetical scenarios of U.S. poverty if counties had not experienced metropolitanization, that is, if counties' classifications in a given year along the five categories were retained over time. In essence, we hold population redistribution and county classification constant over time.

To address our first research question, we analyze metro and nonmetro poverty rates using the 1970 classification scheme, the 2017 classification scheme, and time-varying classification scheme, i.e. three different "levels" of metropolitanization. In this specific analysis metropolitanization refers primarily to the reclassification of counties over time. First we use the 1970 level of metropolitanization—counterfactually testing what aggregated poverty level would be if metropolitanization and county classification had not changed since 1970. Next we use the 2017 level of metropolitanization—which estimates what poverty levels would be if metropolitanization had always been at its modern state. Finally, we employ a time-varying level of metropolitanization, which allows for the reclassification of counties as they varied decade to decade via population redistribution. The time-varying level reflects actual longitudinal changes as counties moved between the five county categories over time. Comparing the results of the three levels allows us to tease out the poverty rates of the counties that experienced metropolitanization and those who had not. Comparing the results across three levels also allows us to estimate how much of the gap between metro and nonmetro poverty is due to reclassification of counties along the metropolitan hierarchy versus how much is due to actual changes in county-level poverty rates within the five different types of counties along the metropolitan hierarchy.

To further test the association between metropolitanization and poverty, we investigate counties whose metropolitan status changed to determine the temporal association between changes in county-level poverty rates and movement up the metropolitanization ladder. Under our conceptual framing, counties that have experienced metropolitanization should display a different pattern of their poverty rates in prior decades and their poverty rates at the time of their transition than counties who have not experienced metropolitanization. Specifically, we examine whether counties that experience metropolitanization

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experience a decrease in poverty in the transition period relative to their poverty rates in previous decades. The absolute and relative changes in poverty are also potentially affected by the type of metropolitanization that these counties have experienced—absorption or emergence—and the transition in poverty rates potentially varies depending on whether the county has moved up the metropolitan hierarchy via absorption or emergence.

To address our second research question regarding how population redistribution has increased exposure to high poverty, we conduct a trend analysis of the percentage of the population in each period that live in high poverty counties. A county is considered a high poverty county (HPC) if its poverty rate is greater than or equal to twenty percent (Lichter and Johnson 2007). Similar to the previous analysis, we estimate changes in exposure to high poverty using three different levels: counties that were a HPC in 1970, counties that were a HPC in 2017, and counties that were classified as HPC in each decade by the time-varying measure. Standardizing HPCs at the 1970 or 2017 level holds county-level poverty rates constant and allows for an estimate of how population redistribution has influenced exposure to high poverty.

We first report the number of counties that are considered HPC in each decade and how HPC status is distributed along the metropolitan hierarchy. We then analyze the proportion of the total population that is exposed to high poverty along the metropolitan hierarchy using the three standardizations of HPCs. For our purposes exposure refers to the percentage of the total population that lives in places of extreme poverty. This analysis is then repeated to track changes in the proportion of the poor population exposed to high poverty over time. Understanding if the poor and total population have different exposures to high poverty when holding poverty constant at different levels is important because of the many consequences of exposure to high poverty. In this analysis we can also provide an estimate of if the poor population is becoming concentrated in a limited number of HPCs.

The final analysis addresses our third research question by focusing on the distribution of the total population and the poor population and how they have shifted since 1970. As part of this analysis we estimate if there has been a long-term divergence in where these two populations reside within the metropolitan hierarchy. Similar to the analysis for the first research question, we hold metropolitanization

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constant at the 1970, 2017 and time-varying levels. The results of this specific analysis estimate the shares of the total population and the shares of the poor population that live in metro and nonmetro counties and along the five-stratum metropolitan hierarchy. By using the three levels of metropolitanization, we answer how much of the redistribution of the population is attributed to the movement of counties between categories and how much is attributed to actual population growth and decline within groups. We can also estimate what changes in the distribution of the poor population specifically are the result of metropolitanization.

Comparing the share of the total and poor population highlights the changing level of overrepresentation or underrepresentation of the poor population in certain parts of the country. In a hypothetical scenario, each county's share of the national total population would equal their share of the national poor population, i.e. this county contains .01 percent of the total population and .01 percent of the poor population. Studies on spatial inequality have shown this is not likely to be true (Lobao et al. 2008; Wang et al. 2012; Weber and Miller 2017). Crudely speaking, certain areas of the country, including nonmetro counties and regions, host a higher share of the nation's poor population than their share of the nation's total population. We calculate a ratio of the counties' share of the poor population to counties' share of the total population since 1970 for both metro and nonmetro counties and along the metropolitan hierarchy using the three levels of metropolitanization.

Results

Poverty Rates over Time

We begin our analysis by examining if poverty rates vary between metro and nonmetro counties when using the 1970, 2017, and time-varying levels of metropolitanization. As shown in Figure 1, although poverty is higher in nonmetro counties than metro counties in all decades across all metropolitanization levels, there are some key differences between the three metropolitanization levels.

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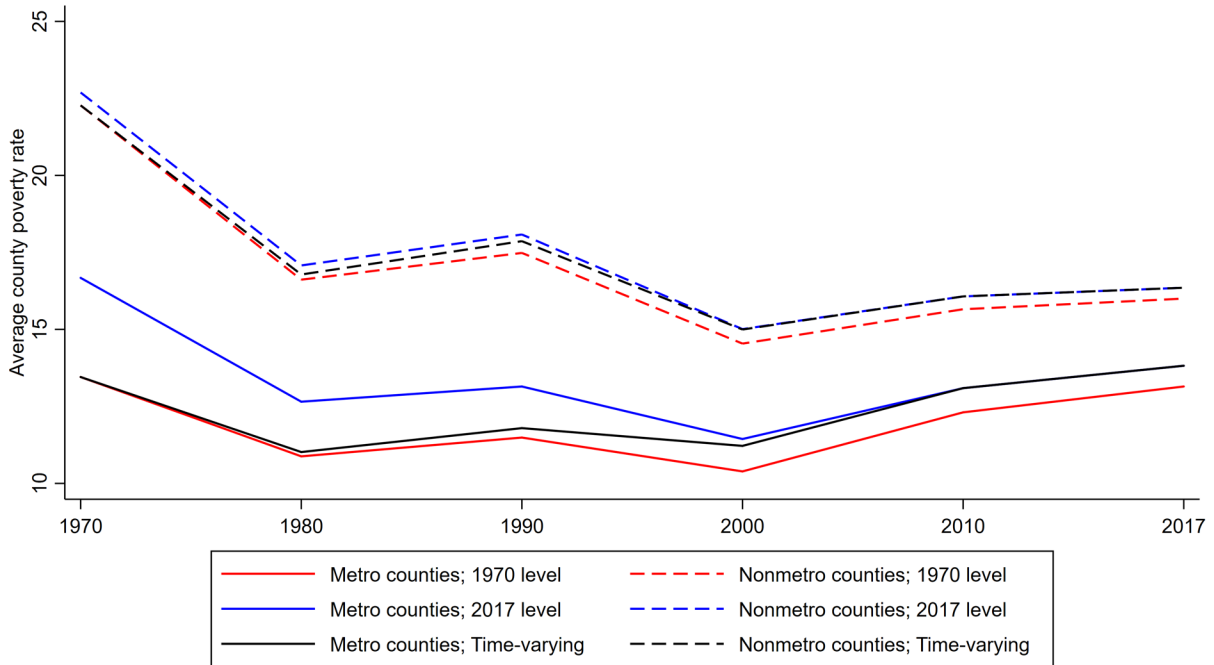


Figure 1. Average county poverty rate for metro and nonmetro counties; 1970, 2017, time-varying level of metropolitanization

The 2017 level of metropolitanization produces the highest poverty rates for nonmetro in every decade, and the 1970 metropolitanization level produces lower average county poverty rates. The potential explanation for this is that over time the nonmetro counties that experienced metropolitanization—transitioning from nonmetro to metro—had on average lower poverty rates than the average *nonmetro* county but higher poverty rates than the average *metro* county. Standardizing metropolitanization to 2017 produces higher poverty rates than the other two levels of metropolitanization, which again suggests that average poverty rates for both metro and nonmetro areas have increased due to metropolitanization. To examine this point further, the differences in average county poverty rate between metro and nonmetro counties would be on average by .04 percentage points smaller if county reclassification had not occurred after 1970 and would 1.02 percentage points larger if county classification was set at 2017 levels.

When examining these results across the metropolitan sequence, similar results emerge (Figure 2). The metropolitan sequence refers to the decade-by-decade process of metropolitanization, specifically whether counties remained metro or nonmetro all decades or if a nonmetro county flipped to being metro

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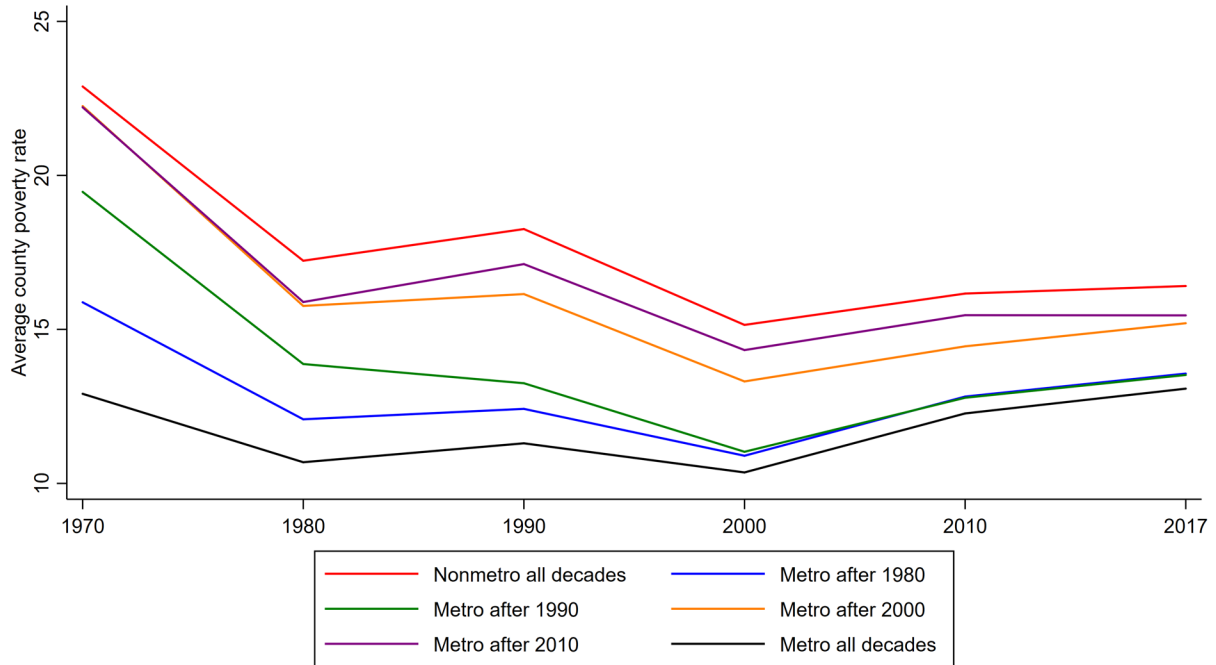


Figure 2. Average county poverty rate by metropolitan sequence

permanently in 1980, 1990, 2000, or 2010.⁴ There is an association between poverty rates in nonmetro counties and the likelihood of metropolitanization, with lower poverty nonmetro counties being more likely to transition to metropolitan than higher poverty nonmetro counties. As shown in Figure 2, nonmetro counties that have never experienced metropolitanization consistently have the highest levels of poverty, whereas counties that have remained consistently metro have the lowest levels of poverty. The other four groupings of counties form a very interesting and telling trend. Counties that experienced metropolitanization in each decade had lower poverty rates than the nonmetro counties in that decade that remained nonmetro. We find that 1980 metropolitanizing counties at the time of their transition have lower poverty rates than 1990 metropolitanizing counties when they transitioned—and so on. These findings reinforce that the nonmetro counties that experience metropolitanization are also the counties with lower relative poverty rates relative to other nonmetro counties, suggesting that population growth is more likely to occur in low poverty places.

⁴ Counties that vacillated between metro and nonmetro were excluded from this analysis.

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Analyzing longitudinal changes along the metropolitan hierarchy produces complementary results. When comparing the three levels of metropolitanization across the metropolitan hierarchy, there is a clear stratification of lowest poverty to highest poverty. The results in Figure 3 show that in all decades, regardless of level of metropolitanization, counties that belong to large metros have the lowest level of poverty—and by a noteworthy margin. Non-CBSA counties are by far the most disadvantaged counties, particularly in the earlier decades. Even though the small and medium metros fare better than nonmetro counties from 1970 to 2017, there is still a large gap between these counties and large metro counties. One potential explanation for the gap between types of metro is suburban counties. Large metros likely have many suburbs, which tend to have lower levels of poverty. In contrast, small and medium metro counties have less suburbs, which results in them having a higher average poverty rate.

If county reclassification had not occurred, a scenario represented by the 1970 metropolitanization level, poverty rates would be .6 percentage points lower on average for all hierarchy groups. The 2017 level of metropolitanization produces poverty rates .6 points higher on average than the time-varying metropolitanization scenario. Similar to the binary metro-nonmetro analysis, population redistribution has increased poverty rates due to the shifting and reclassification intermediate poverty counties.

To test whether metropolitanizing counties had lower poverty rates than the nonmetro counties they left behind, the results in Table 1 provide a summary of the average county poverty rate during counties' decade of transition and the prior decade. In three of the four decades, counties that experienced metropolitanization experienced significant decreases in poverty, with the exception of 2010 where the trend was reversed.⁵ These results demonstrate that in 1970, nonmetro counties an average poverty rate of 22.3 percent, while nonmetro counties that experienced metropolitanization had an average poverty rate of 16.2 percent. Moreover, in 1980 metro counties had a poverty rate of 11 percent and nonmetro counties that transitioned had a rate of 12.4 percent; suggesting that transition counties had a poverty rate that is similar

⁵ It is possible that 2010 was an exception due to the economic conditions of the Great Recession, which resulted in increases in poverty nationally (Rickman and Guettabi 2015; Slack and Myers 2014; Thiede and Monnat 2016).

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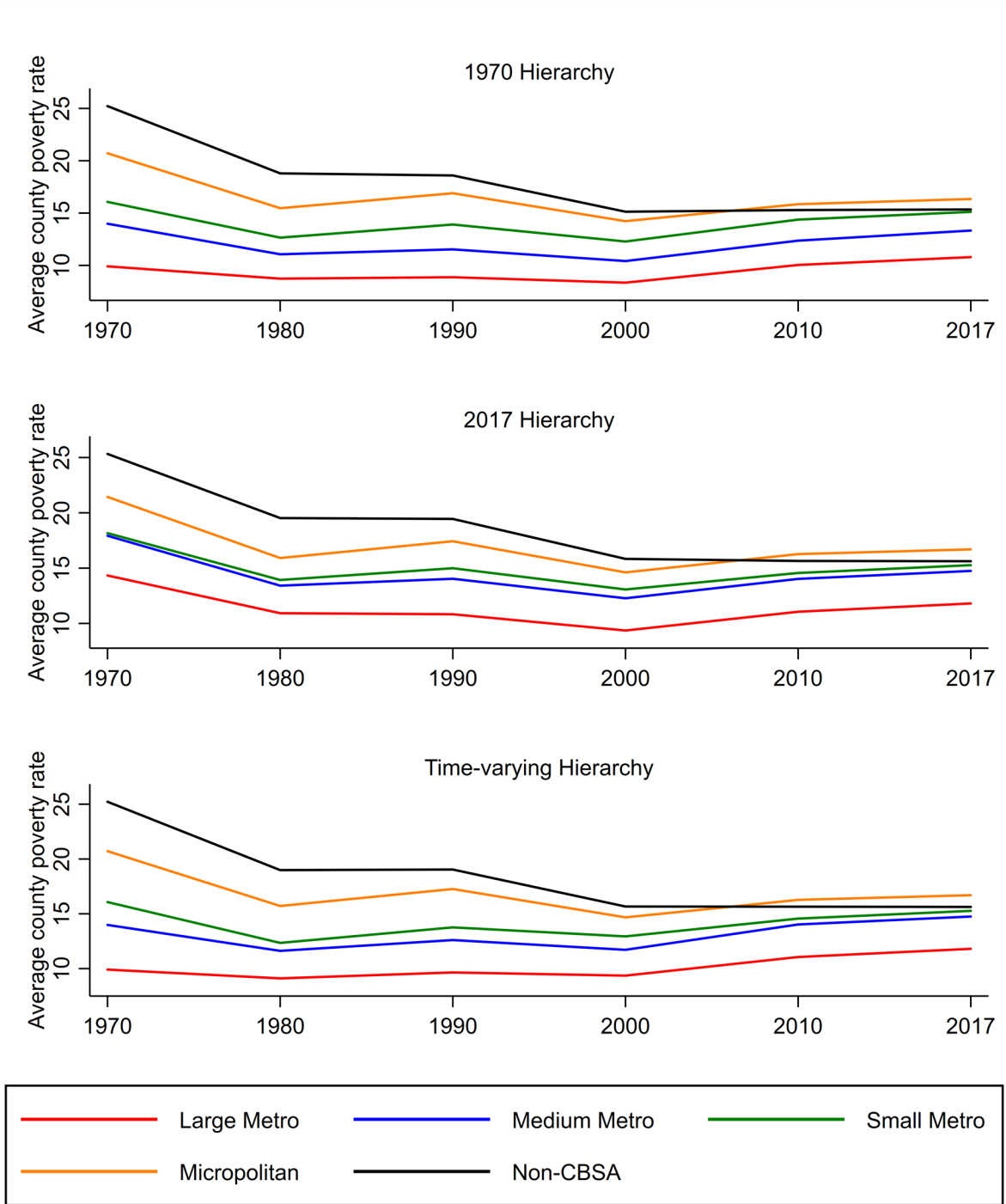


Figure 3. Average county poverty rate along the metropolitan hierarchy; 1970, 2017, time-varying level of metropolitanization

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Table 1. Average county poverty rate for counties that experienced metropolitanization by decade

Year		Prior Decade		Transition Decade		Freq.
1980	Nonmetropolitan Counties	.223	(.112)	.168	(.073)	
	Metropolitan absorption	.191	(.094)	.134	(.062)	49
	Metropolitan emergence	.145	(.055)	.117	(.037)	86
	All metropolitanizing counties	.162	(.075)	.124	(.048)	135
1990	Nonmetropolitan Counties	.168	(.073)	.179	(.078)	
	Metropolitan absorption	.140	(.049)	.152	(.083)	8
	Metropolitan emergence	.136	(.050)	.133	(.055)	105
	All metropolitanizing counties	.136	(.050)	.134	(.057)	113
2000	Nonmetropolitan Counties	.179	(.078)	.150	(.065)	
	Metropolitan absorption	.162	(.074)	.127	(.059)	217
	Metropolitan emergence	.153	(.055)	.141	(.048)	79
	All metropolitanizing counties	.159	(.069)	.131	(.057)	296
2010	Nonmetropolitan Counties	.150	(.065)	.161	(.063)	
	Metropolitan absorption	.148	(.066)	.159	(.074)	69
	Metropolitan emergence	.127	(.046)	.142	(.046)	42
	All metropolitanizing counties	.140	(.060)	.152	(.065)	111

Note: Standard Deviations in Parenthesis

to metro counties. These results also suggest that counties that experience metropolitanization have larger decreases in poverty than counties that do not experience metropolitanization. That is, metropolitanization is associated with larger decreases in poverty.

There are also significant differences between counties that became metro through absorption versus counties that became metro through emergence. In all decades, absorption counties had higher poverty rates than emergence counties. However, absorption counties experienced larger decreases in poverty from decade to decade.⁶ The differing mechanisms that drive the processes of emergence and absorption may explain why these counties have different poverty rates. Emergence counties became metro through population growth, and this growth is likely associated with their lower poverty rates compared to other nonmetro counties at the time. Absorption counties did not necessarily experience population growth but instead experienced increased connections to nearby metros, primarily through commuting changes. These connections potentially lead to large decreases in poverty over time due to theoretical newfound access to a metro labor market and its higher wages.

⁶1990 is an exception, potentially due to small number of transitioning counties during that decade.

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Table 2. Average County Poverty Rate of Counties that experienced steps up in metropolitan hierarchy by decade

Year		<u>Metropolitanizing Counties</u>			<u>Counties in Metropolitanizing Groups</u>	
		Prior Decade	Transition Decade	Freq.	Prior Decade	Transition Decade
1980	Large Metro	.127 (.054)	.104 (.039)	55	.099 (.049)	.091 (.044)
	Medium Metro	.176 (.088)	.135 (.054)	74	.140 (.068)	.116 (.044)
	Small Metro	.160 (.066)	.127 (.043)	73	.161 (.079)	.123 (.045)
	Micropolitan	.261 (.114)	.177 (.076)	97	.207 (.106)	.157 (.068)
	Total	.191 (.102)	.141 (.064)	299		
1990	Large Metro	.118 (.045)	.112 (.048)	75	.091 (.044)	.096 (.050)
	Medium Metro	.139 (.054)	.146 (.068)	72	.116 (.044)	.126 (.055)
	Small Metro	.138 (.049)	.129 (.045)	36	.123 (.045)	.138 (.049)
	Micropolitan	.168 (.072)	.171 (.085)	33	.157 (.068)	.173 (.075)
	Total	.136 (.056)	.135 (.064)	216		
2000	Large Metro	.134 (.067)	.106 (.044)	127	.096 (.050)	.094 (.046)
	Medium Metro	.157 (.076)	.129 (.061)	103	.126 (.055)	.117 (.050)
	Small Metro	.157 (.063)	.135 (.055)	148	.138 (.049)	.129 (.050)
	Micropolitan	.213 (.101)	.168 (.080)	61	.173 (.075)	.147 (.062)
	Total	.158 (.077)	.130 (.061)	439		
2010	Large Metro	.109 (.039)	.134 (.045)	30	.094 (.046)	.111 (.047)
	Medium Metro	.145 (.063)	.159 (.063)	71	.117 (.050)	.140 (.051)
	Small Metro	.140 (.057)	.146 (.064)	63	.129 (.050)	.146 (.051)
	Micropolitan	.132 (.056)	.157 (.061)	34	.147 (.062)	.163 (.059)
	Total	.136 (.057)	.151 (.061)	198		

Note: Standard Deviations in Parenthesis

Similar trends between metropolitanization and changing poverty rates can be seen when examining these results across the metropolitan hierarchy—as shown in Table 2. With the exception of 2010, counties that made upward transitions had lower poverty rates after transitioning than before transitioning; on average, they experienced a decrease in poverty by 2.6 percentage points. On average, the non-CBSA counties who transitioned upward to micropolitan counties saw the largest decreases in poverty—with an average decrease of 4.2 percentage points. The smallest decreases are for those that transitioned to being large metros. Non-CBSA counties likely benefit the most from transitioning because, at a fundamental level, an urban center in the county grew to over 2,500 people, which is likely associated with beneficial shifts in the labor force and industrial composition in the county.

Overall, this set of analysis demonstrate that our understanding of longitudinal trends in metro-nonmetro poverty is inherently linked to county reclassification. We find that if the population distribution

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was held constant at 1970 levels, then all groups of counties along the metropolitan hierarchy would have lower poverty rates. These analyses have also demonstrated that there is an association between decreases in poverty and the likelihood of counties experiencing metropolitanization.

Exposure to High Poverty

We now analyze how exposure to high poverty has changed over time. Similar to the prior set of analyses, we compare three standardizations at the 1970, 2017, and time-varying levels, but instead of standardized metropolitanization, we now standardize poverty rates and the destination of being a high poverty county (HPCs). With this standardization, we hold poverty constant over time and estimate how population redistribution has affected exposure to high poverty. In 1970, 1,288 counties were HPCs, comprising approximately 40 percent of counties in the U.S. (Table 3). The vast majority of those counties were nonmetro. Within nonmetro counties, over 60 percent of non-CBSA counties were HPCs and 42 percent of HPCs were micropolitan counties. By 2017 there are only 611 HPCs, a decrease from 1970 of approximately 52.6 percentage. In each decade, the proportion of nonmetro counties that are HPCs has decreased. Additionally, the distribution of HPCs in nonmetro counties has shifted from primarily non-CBSA to primarily micropolitan. This is consistent with findings in other studies (Thiede et al. 2018). Notably, there has been an increase in the number HPCs that are metro counties. Among metro counties, large metro counties are the least likely to be high poverty, but the number of large metro counties that are high poverty has more than tripled since 1970.

Analyzing the percentage of the population living in HPCs, rather than the percentage of counties that are HPCs, provides a different story—as shown in Table 4. If poverty rates had been held constant at 1970 levels, then the exposure to high poverty for the total population would have increased by approximately .6 percentage points. This increase in exposure is not entirely linear, with slight variations from decade to decade. However, by 2017, 14 percent of the population would live in HPCs, compared to 10.8 percent of the population if poverty rates had changed over time. An initial takeaway is that population is concentrating in places that once had extremely high poverty. This increase in exposure almost entirely occurs among the population residing in metro areas, with the percentage of the nonmetro population living

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Table 3. Number of high poverty counties (HPC) by metro status and along the metropolitan hierarchy by decade.

	Total	Nonmetro	Metro	Large Metro	Med. Metro	Small Metro	Micro.	Non-CBSA
1970								
Number of Counties	1,288	1,190	98	8	43	47	676	514
Percent of Counties	41.58	48.39	15.34	4.42	16.1	24.61	41.99	60.54
1980								
Number of Counties	663	632	31	8	12	11	354	278
Percent of Counties	21.4	26.64	4.27	3.45	4.1	5.47	22.15	35.92
1990								
Number of Counties	765	703	62	13	28	21	440	263
Percent of Counties	24.69	30.94	7.51	4.26	8.78	10.4	29.29	34.16
2000								
Number of Counties	428	368	60	10	20	30	232	136
Percent of Counties	13.82	18.21	5.57	2.45	6.23	8.62	17	20.73
2010								
Number of Counties	531	430	101	18	42	41	293	137
Percent of Counties	17.14	22.1	8.77	4.23	11.26	11.61	22.21	21.85
2017								
Number of Counties	611	487	124	25	50	49	346	141
Percent of Counties	19.72	25.03	10.76	5.87	13.4	13.88	26.23	22.49

Note: High poverty counties are counties that have a poverty rate of 20 percent or more

in HPCs decreasing. Decomposing this change over time and within metro counties demonstrates that most of the increases in exposure are experienced by the populations in large and medium metros. Among nonmetro counties, most of the decrease in exposure is within micropolitan counties. A potential explanation for this apparently contradictory results is that most of the growth in nonmetro counties has occurred in counties with lower poverty rates, whereas most of the growth in metro counties has occurred in high poverty counties.

In contrast to the distribution of the total population, the poor population has become less concentrated in HPCs since 1970—decreasing their exposure to high poverty. If poverty were held constant at 1970 levels, the percentage of the poor population exposed to high poverty would have decreased by 10.8 percentage points. There would have also been a sizeable decrease in the poor population living in nonmetro HPCs—a decrease of 14.1 percentage points. Concurrently, this scenario would have also seen the share of the poor population living in metro HPCs increase. Past research would suggest that the poor population is moving from nonmetro HPCs to metro HPCs (Foulkes and Schafft 2010; Nord et al. 2010), which is consistent with the results of this analysis. Alternatively, metropolitanization could have contributed to this process in that as nonmetro HPCs increased in population, they flipped to metro HPCs. In this manner,

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Table 4. Distribution of the total and poor population living in high poverty counties (HPC) by metro status and along the metropolitan hierarchy ; 1970, and 2017, time-varying high poverty counties

Year	<u>Total Population</u>								<u>Poor Population</u>							
	Total	Nonmetro	Metro	Large Metro	Med. Metro	Small Metro	Micro.	Non-CBSA	Total	Nonmetro	Metro	Large Metro	Med. Metro	Small Metro	Micro.	Non-CBSA
1970 HPCs																
1970	.134	.100	.033	.004	.017	.012	.079	.021	.293	.230	.063	.008	.030	.025	.177	.053
1980	.142	.100	.042	.006	.023	.012	.082	.018	.239	.173	.066	.009	.036	.020	.140	.033
1990	.138	.086	.052	.013	.027	.012	.070	.016	.230	.150	.080	.018	.043	.019	.122	.028
2000	.140	.074	.066	.021	.025	.021	.062	.012	.205	.114	.090	.023	.039	.029	.096	.018
2010	.141	.065	.076	.024	.032	.020	.055	.010	.193	.097	.096	.023	.046	.026	.082	.015
2017	.140	.062	.078	.025	.032	.020	.052	.010	.184	.089	.095	.025	.044	.026	.076	.013
Total	.139	.082	.021	.028	.018	.067	.015	.083	.224	.146	.088	.022	.041	.026	.117	.028
2017 HPCs																
1970	.142	.057	.084	.060	.015	.009	.049	.009	.247	.136	.111	.070	.023	.018	.111	.025
1980	.131	.056	.075	.047	.019	.009	.049	.007	.227	.106	.120	.076	.029	.016	.090	.016
1990	.122	.049	.074	.045	.020	.009	.042	.007	.222	.096	.126	.074	.037	.015	.081	.015
2000	.116	.042	.074	.042	.020	.013	.037	.005	.209	.076	.133	.073	.037	.022	.066	.010
2010	.111	.038	.072	.037	.024	.011	.034	.005	.188	.066	.122	.062	.043	.018	.058	.008
2017	.108	.036	.072	.037	.024	.011	.032	.004	.181	.062	.119	.060	.042	.018	.054	.008
Total	.122	.047	.074	.042	.021	.011	.041	.006	.212	.092	.123	.068	.038	.018	.078	.014
Time-varying HPCs																
1970	.134	.100	.033	.004	.017	.012	.079	.021	.293	.230	.063	.008	.030	.025	.177	.053
1980	.096	.047	.049	.040	.005	.005	.037	.010	.196	.102	.094	.074	.010	.010	.078	.024
1990	.105	.052	.053	.028	.017	.008	.043	.009	.208	.108	.101	.052	.034	.015	.088	.020
2000	.072	.027	.045	.025	.012	.008	.022	.004	.149	.056	.093	.052	.025	.015	.047	.009
2010	.091	.032	.059	.030	.019	.010	.027	.004	.162	.058	.104	.051	.036	.017	.050	.008
2017	.108	.036	.072	.037	.024	.011	.032	.004	.181	.062	.119	.060	.042	.018	.054	.008
Total	.108	.059	.054	.030	.018	.010	.047	.012	.216	.128	.097	.052	.033	.018	.098	.029

Note: High poverty counties are counties that have a poverty rate of 20 percent or more

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exposure to nonmetro poverty become exposure to metro poverty, and the nonmetro poor become the metro poor. However, our earlier analysis demonstrates that low poverty counties are more likely to have metropolitanized—which provides contradictory evidence of this explanation.

Comparing these results to the time-varying level of HPCs demonstrates that although the poor population experienced a decrease in the level of exposure to high poverty over time, this decrease would have been slightly larger, around .3 points larger if poverty would have remained at 1970 levels. Most of the difference between the 1970 level of poverty and the time-varying level is within the groups of the metropolitan hierarchy. The decrease in exposure for the nonmetro poor is 2.7 percentage points larger when using the time-varying levels. If poverty had remained constant at 1970 levels, then by 2017 only 9.5 percent of poor population would live in metro HPCs compared to the time-varying scenario where 11.9 percent of the poor population would live in metro HPCs. Time-varying poverty rates results in a larger percentage of the poor population living in large metro HPCs. Although our results do not directly speak to specific ethno-racial or immigrant subgroups, it is possible that the growing immigrant population in the nation's largest metros has greatly affected exposure to high poverty (Boustan and Shertzer 2013; Frey 2014).

We also examine the exposure to high poverty using the 2017 level of HPCs. If poverty rates had always been at 2017 levels than exposure to high poverty for the total population would have decreased—for both the metro and nonmetro areas. The 2017 level of poverty is the only level of metropolitanization where the metro population experienced a decrease in exposure to poverty. The difference between the poverty rates among the three standardizations is likely due to the number of HPCs in each of the decades. As stated previously, 1,288 counties have poverty rates over 20 percent in 1970, compared to just 611 counties in 2017. Although overall metro residents experienced a decrease in exposure to poverty when using the 2017 level of HPCs, medium and small metros experienced a small increase in exposure to poverty. Most of the decrease in exposure for residents of metro counties is due to changing exposure in large metros. In this counterfactual scenario, the total population is shifting away from large metro HPCs, which is not found to be true when using the 1970 and time-varying poverty levels.

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Similar to the other scenarios, holding poverty at 2017 levels facilitates decreases in exposure to high poverty for the poor population, overall. Yet out of the three scenarios, the 2017 level sees the smallest decreases in exposure for the nonmetro poor and the smallest increases for the metro poor. When decomposing the change over time to the metropolitan hierarchy, the direction of change is inconsistent for the types of metros between the three scenarios. The large and small metro poor are becoming more concentrated in HPCs when using the 1970 and time-varying levels of poverty but are deconcentrating when using in the 2017 level. An explanation is that metro HPC in 1970 and in 2017 have compositional differences, beside poverty rates, that have influenced exposure to high poverty. The potential explanation for this inconsistency cannot be fully determined with this set of analysis alone.

The most consistent and prominent finding across these analyses is that exposure to high poverty for those living in nonmetro counties, both poor and non-poor, decreases in all three scenarios—however, the largest decrease is when poverty rates are allowed to vary. As shown by our prior analysis and reinforced by previous research, poverty rates in nonmetro areas have decreased since 1970. This has facilitated larger decreases in exposure to high poverty than if poverty had remained constant at either 1970 or 2017 levels (Lichter and Schafft 2017; Weber and Miller 2017).

The Distribution of the Total and Poor Population

The last analysis addresses how the distribution of the total population and the poor population has changed during the study period, and how this would differ if metropolitanization was held at different levels (Table 5). Under the time-varying level of metropolitanization, the distribution of the total population living in nonmetro and metro counties shifted by 12.4 percentage points between 1970 and 2017. These changes do not refer to actual growth or decline in population size, but instead the changes in the relative proportion of the national population that resides in each group of counties. This shift is well documented (Johnson and Lichter 2019; Lichter and Brown 2011). Decomposing this change along the metropolitan hierarchy yields interesting results. Most of the gain for metro areas was due to the increasing share of large metros, whose share of the total population grew by 13.9 percentage points. Most of the relative loss for

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Table 5. Distribution of total and poor population by metro status and along the metropolitan hierarchy; 1970, and 2017, time-varying level of metropolitanization

Year	Nonmetro	Metro	Total Population					Poor Population							
			Large Metro	Med. Metro	Small Metro	Micro.	Non-CBSA	Large Metro	Med. Metro	Small Metro	Micro.	Non-CBSA			
1970 Level															
1970	.267	.733	.420	.227	.086	.235	.032	.392	.608	.313	.202	.093	.327	.065	
1980	.277	.723	.400	.231	.091	.243	.034	.339	.661	.357	.211	.094	.286	.053	
1990	.267	.733	.404	.236	.092	.235	.032	.328	.672	.356	.217	.099	.281	.046	
2000	.265	.735	.401	.240	.094	.232	.033	.297	.703	.381	.224	.098	.257	.040	
2010	.264	.736	.396	.245	.096	.231	.032	.295	.705	.362	.238	.105	.258	.037	
2017	.256	.744	.400	.247	.097	.225	.031	.282	.718	.368	.245	.105	.248	.034	
Total	.266	.734	.404	.238	.093	.234	.033	.322	.678	.356	.223	.099	.276	.046	
2017 Level															
1970	.180	.820	.537	.192	.091	.159	.021	.279	.721	.427	.193	.102	.235	.043	
1980	.180	.820	.526	.200	.094	.160	.021	.233	.767	.475	.195	.098	.199	.034	
1990	.166	.834	.539	.203	.092	.148	.018	.220	.780	.475	.204	.102	.191	.028	
2000	.158	.842	.546	.204	.091	.142	.017	.189	.811	.508	.206	.097	.166	.023	
2010	.151	.849	.550	.208	.092	.135	.016	.180	.820	.501	.218	.100	.161	.019	
2017	.143	.857	.559	.208	.090	.128	.015	.167	.833	.515	.220	.098	.150	.017	
Total	.163	.837	.543	.202	.092	.145	.018	.211	.789	.483	.206	.099	.184	.027	
Time-varying Level															
1970	.267	.733	.420	.227	.086	.235	.032	.392	.608	.313	.202	.093	.327	.065	
1980	.240	.760	.451	.219	.091	.212	.028	.303	.697	.402	.204	.092	.259	.044	
1990	.203	.797	.500	.217	.079	.179	.024	.264	.736	.437	.213	.086	.227	.037	
2000	.173	.827	.535	.193	.099	.154	.019	.204	.796	.500	.190	.106	.180	.024	
2010	.151	.849	.550	.208	.092	.135	.016	.180	.820	.501	.218	.100	.161	.019	
2017	.143	.857	.559	.208	.090	.128	.015	.167	.833	.515	.220	.098	.150	.017	
Total	.200	.814	.518	.211	.091	.177	.023	.259	.765	.465	.209	.097	.222	.036	

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nonmetro areas was in micropolitan counties. However, non-CBSA counties experienced the most dramatic decrease at more than 50 percent.

Changes over time are even larger when estimating the change in share of the poor population. The change in the distribution between 1970 and 2017 was 22.5 percentage points, which translates to the share of the poor population living in nonmetro areas decreasing by 57.4 percent. Like with the total population, most of the loss of nonmetro was in micropolitan counties, but the proportional decrease of micropolitan counties was 54.2 percent and 73.2 percent for non-CBSA counties. There were significant gains in the proportion of the poor population living in large metros. Overall, there has been a general transfer of the total and poor population from nonmetro to metro areas, and this shift was larger for the poor population. Based on prior analysis featured in this study and previous research literature on the topic, poverty rates of nonmetro areas have declined over time—likely contributing to the decrease in the proportion of the poor living in nonmetro counties (Weber and Miller 2017).

These proportional shifts from metro to nonmetro are inherently linked to the metropolitanization process. If metropolitanization had remained at 1970 levels, the shift in the total population between metro and nonmetro would have very small—representing a change of only 1.1 percentage points. The change in the distribution of the poor population would have been smaller as well, but still significant at 11 percentage points. Similar to the time varying, most of the change in the distribution appears to be from losses in micropolitan counties to gain in large metros. If metropolitanization was always at 2017 levels, then the change in the distribution from nonmetro to metro for the total and poor populations would have been 3.7 percentage points and 11.2 points, respectively. Comparing these two counterfactual scenarios to reality shows that most of the change in distribution of the total population is due to metropolitanization. The growth or decline of counties that remained nonmetro and metro had limited effects on the population distribution. Furthermore, nonmetro counties that experience growth are likely to grow at a level that eventually results in metropolitanization, and over multiple decades growing nonmetro counties are unlikely to remain nonmetro.

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We find that even when controlling for metropolitanization there is still noticeable change in the distribution of the poor population. The poor population is shifting from nonmetro to metros for a number of potential reasons. We find that the poor people are shifting away from nonmetro areas and that these gains are primarily experienced by large and medium metros. Past research indicates that poor people move to poor places and that destination counties tend to be even poorer counties than the counties they left (Foulkes and Schafft 2010; Nord 1998; Nord et al. 2010). Within this analysis, this migration could be manifested in poor families leaving poor micropolitan and non-CBSA counties and moving to poor metros counties or moving to the higher poverty neighborhoods or inner-ring suburbs of metros (Cooke 2010). An alternative explanation for the changing distribution of is that regardless of metropolitanization, county-level socioeconomic conditions are fluctuating regardless of population change. In the aggregate, some of these socioeconomic changes are helping families and persons escape poverty in nonmetro areas while other forces are causing families and persons in metro areas to fall into poverty.

Another dimension of understanding the changing distribution of the total and poor population is estimating the changing ratio between the two along the metropolitan hierarchy. In a theoretical scenario with balanced populations, every county's share of the national total population would match its share of the national poor population—something that is unlikely to be true in reality. As shown in Figure 4, regardless of level of metropolitanization, non-CBSA counties have the highest ratio of poor population share to total population share across all time periods. At the other end of the spectrum, large metros have the smallest ratio, which is under 1.0 in all periods. There is a general convergence of all groups towards an equal ratio by 2017, and this convergence is the strongest when using the 1970 level of metropolitanization. Using these ratios provides a direct answer to whether the total and poor population are experiencing a divergence in their long-term distribution. Based on these estimates, it appears that the distribution of the two populations is equalizing across the metropolitan hierarchy.

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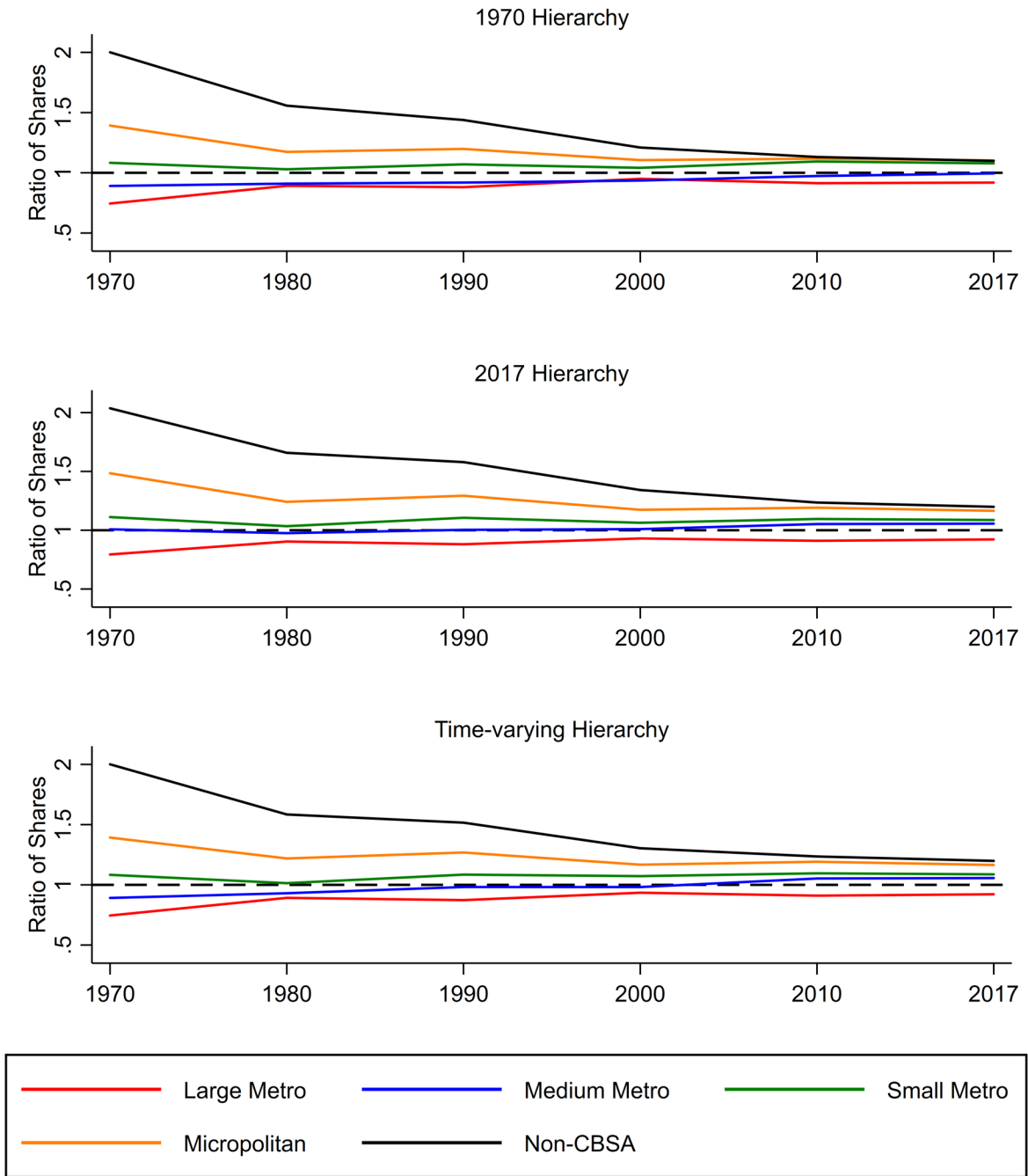


Figure 4. Ratio of share of national poor population to share of national total population by metropolitan hierarchy; 1970, and 2017, time-varying level of metropolitanization.

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Despite emerging equilibrium of the total and poor population between hierarchy groups, there is still a movement of both populations away from nonmetro counties to metro counties. Most of the change in distribution appears to be from micropolitan counties to large metros. In summary, we find that the change in the distribution of the total population since 1970 is almost entirely due to the metropolitanization process, but that the movement of the poor population occurs independently of this process.

Discussion and Conclusions

Our “monitoring of the metropolitanization process” has yielded several significant insights on the relationship between metropolitanization and poverty since 1970. Most prominent among these findings is that the metropolitanization process—as represented by the movement of counties from nonmetro to metro or the movement up the five strata metropolitanization hierarchy—influences our understanding of how poverty rates have changed. We find that even though the gap in poverty rates between metro and nonmetro persists regardless of population redistribution and county reclassification, the size of the gap is affected by metropolitanization. Nonmetro counties that experienced metropolitanization had relatively low poverty rates, leaving only the comparatively poorer counties as nonmetro. This is significant in that the persistent disadvantage in nonmetro America can be attributed to the classification, specifically what counties are considered nonmetro has become biased towards high poverty counties over time. Future research on socioeconomic change in nonmetro America should take this into consideration. We also find that nonmetro counties that became metro via metropolitan emergence had significantly lower poverty rates than those that experienced metropolitan absorption. Future research is needed on how other major socioeconomic indicators, besides poverty, have been affected by the metropolitanization process.

Our findings are relevant for metro areas as well. The largest metro areas have a significantly lower average poverty rates than all other types of counties along the metropolitan hierarchy. This advantage is likely rooted in the number of suburban counties that comprise large metro areas. Future analyses should examine how poverty levels of the central cities of metro areas are affected by

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the metropolitanization process and how population distribution has either increased or decreased poverty rates in these areas.

Overall, exposure to high poverty has decreased since 1970 for the United States despite an increase in exposure for the residents of metro areas—especially those in large metros. This general finding is reinforced by other studies on this topic (Iceland and Hernandez 2017). There has also been a significant decrease in exposure to high poverty for the nation’s poor population, but decomposing this change reveals that the nonmetro poor population have been become less concentrated in high poverty counties while the metro poor have become more concentrated in high poverty counties. Among metro counties, the poor have become increasingly concentrated in large metro HPCs.

It is likely that much of this change in exposure is due to changes in population redistribution. If poverty rates had remained at 1970 levels, then exposure to high poverty would have increased instead of decreased, with even larger gains for the metro population, both poor and non-poor. We speculate that it could be that the total population is moving to places that had historically high poverty rates. This is further supported in that the population has moved away from places that were HPCs in 2017. Changes in the distribution of the immigrant population may also contribute to the changes in exposure for the metro population. The immigrant population has diversified in where they live geographically over time (Massey and Capoferro 2008). New destination areas in the Midwest and South may have had high poverty levels in the 1970s, but these levels may have decreased longitudinally, making these metros more attractive to immigrants. In line with past research on concentrated poverty, we find that although that nonmetro poverty is becoming less concentrated over time, much of the remaining concentration is in micropolitan areas (Lichter and Johnson 2007; Thiede et al. 2018).

In response to our third research question, we find that most population redistribution since 1970 is due to the metropolitanization process. Holding metropolitanization constant at either 1970 and 2017 levels produces minimal changes in the distribution of the total population. We estimate that most changes in the distribution of the population from metro to nonmetro is more due to the reclassification of counties from nonmetro to metro rather than drastic changes in the population share of counties. The changing

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distribution of the poor population is a different matter, and that long term changes occur even when controlling for metropolitanization. County-level poverty rates are changing at different levels for different parts of the country which is changing the distribution of the poor population. Families are falling into poverty in some regions of the country while in other regions families are escaping poverty, which at the aggregate is affecting the geography of poverty. Most of the shifts in the poor population appear to be from micropolitan areas to large metros.

Despite what our initial conceptual approach would have suggested, we find that regardless of metropolitanization, the total population and the poor population are converging across the metropolitan hierarchy over time. Nonmetro places historically host a disproportionate percentage of the nation's poor population, but we find that the ratio of poor to total population is equalizing along the metropolitan hierarchy. This could be beneficial in the long run because metro places are potentially better able to support an increased share of poor population, not only helping nonmetro places grow economically but also helping more families escape poverty.

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Appendix

Appendix tables provide point estimates of values and statistics shown in each figure.

Table A1. Average county poverty rate for metro and nonmetro counties; 1970, 2017, time-varying level of metropolitanization

Year	1970		2017		Time Varying	
	Nonmetro	Metro	Nonmetro	Metro	Nonmetro	Metro
1970	.223 (.112)	.135 (.071)	.227 (.114)	.167 (.094)	.223 (.112)	.135 (.071)
1980	.166 (.073)	.109 (.046)	.171 (.075)	.127 (.057)	.168 (.073)	.110 (.046)
1990	.175 (.078)	.115 (.054)	.181 (.079)	.131 (.063)	.179 (.078)	.118 (.054)
2000	.145 (.064)	.104 (.047)	.150 (.065)	.114 (.052)	.150 (.065)	.112 (.051)
2010	.157 (.062)	.123 (.048)	.161 (.063)	.131 (.052)	.161 (.063)	.131 (.052)
2017	.160 (.064)	.131 (.048)	.164 (.066)	.138 (.052)	.164 (.066)	.138 (.052)
Total	.171 (.081)	.119 (.054)	.175 (.083)	.135 (.065)	.176 (.083)	.125 (.055)

Note: Standard Deviations in Parenthesis

Table A2. Average county poverty rate by metropolitan sequence

Year	Nonmetro all decades	Metro after 1980	Metro after 1990	Metro after 2000	Metro after 2010	Metro all decades	Total
1970	.229 (.114)	.159 (.074)	.195 (.082)	.223 (.113)	.222 (.102)	.129 (.067)	.205 (.111)
1980	.172 (.075)	.121 (.046)	.139 (.048)	.158 (.068)	.159 (.062)	.107 (.045)	.155 (.072)
1990	.183 (.079)	.124 (.053)	.133 (.050)	.161 (.070)	.171 (.077)	.113 (.054)	.163 (.078)
2000	.151 (.065)	.109 (.048)	.110 (.038)	.133 (.057)	.143 (.061)	.104 (.048)	.138 (.063)
2010	.162 (.063)	.128 (.051)	.128 (.044)	.145 (.054)	.155 (.068)	.123 (.048)	.150 (.061)
2017	.164 (.066)	.136 (.051)	.135 (.046)	.152 (.055)	.155 (.059)	.131 (.048)	.155 (.062)
Total	.177 (.083)	.129 (.057)	.140 (.059)	.162 (.078)	.167 (.077)	.118 (.053)	.161 (.080)

Note: Standard Deviations in Parenthesis

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Table A3. Average county poverty rate along the metropolitan hierarchy; 1970, 2017, time-varying level of metropolitanization

Year	1970					2017					Time Varying				
	Large Metro	Med. Metro	Small Metro	Micro.	Non-CBSA	Large Metro	Med. Metro	Small Metro	Micro.	Non-CBSA	Large Metro	Med. Metro	Small Metro	Micro	Non-CBSA
1970	.099	.140	.161	.207	.252	.143	.179	.182	.214	.253	.099	.140	.161	.207	.252
	(.049)	(.068)	(.079)	(.106)	(.118)	(.085)	(.101)	(.090)	(.109)	(.120)	(.049)	(.068)	(.079)	(.106)	(.118)
1980	.087	.111	.127	.155	.188	.109	.134	.139	.159	.195	.091	.116	.123	.157	.190
	(.044)	(.039)	(.049)	(.068)	(.076)	(.053)	(.059)	(.054)	(.071)	(.077)	(.044)	(.044)	(.045)	(.068)	(.077)
1990	.089	.115	.139	.169	.186	.108	.140	.150	.174	.195	.096	.126	.138	.173	.190
	(.050)	(.045)	(.057)	(.075)	(.082)	(.058)	(.066)	(.058)	(.077)	(.083)	(.050)	(.055)	(.049)	(.075)	(.083)
2000	.083	.104	.123	.142	.151	.094	.123	.131	.146	.158	.094	.117	.129	.147	.157
	(.049)	(.039)	(.048)	(.061)	(.068)	(.045)	(.054)	(.050)	(.062)	(.069)	(.046)	(.050)	(.050)	(.062)	(.069)
2010	.100	.124	.144	.158	.153	.111	.140	.146	.163	.157	.111	.140	.146	.163	.157
	(.048)	(.040)	(.047)	(.058)	(.068)	(.047)	(.051)	(.051)	(.059)	(.069)	(.047)	(.051)	(.051)	(.059)	(.069)
2017	.108	.133	.151	.163	.153	.118	.147	.153	.167	.156	.118	.147	.153	.167	.156
	(.050)	(.041)	(.046)	(.060)	(.071)	(.047)	(.049)	(.052)	(.060)	(.075)	(.047)	(.049)	(.052)	(.060)	(.075)
Total	.095	.121	.141	.166	.181	.114	.144	.150	.171	.186	.103	.132	.142	.170	.187
	(.049)	(.048)	(.057)	(.076)	(.090)	(.060)	(.068)	(.063)	(.078)	(.091)	(.048)	(.054)	(.055)	(.077)	(.092)

Note: Standard Deviations in Parenthesis

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Table A4. Ratio of share of national poor population to share of national total population by metropolitan hierarchy; 1970, and 2017, time-varying level of metropolitanization

		Nonmetro	Metro	Large Metro	Med. Metro	Small Metro	Micro.	Non-CBSA
1970 Level	1970	1.467	.830	.745	.891	1.083	1.393	2.001
	1980	1.221	.915	.892	.910	1.030	1.174	1.558
	1990	1.228	.917	.881	.919	1.070	1.199	1.439
	2000	1.119	.957	.950	.936	1.042	1.106	1.210
	2010	1.119	.957	.914	.974	1.094	1.117	1.132
	2017	1.102	.965	.919	.995	1.078	1.103	1.099
	Total	1.210	.924	.882	.938	1.066	1.183	1.409
	2017 Level							
2017 Level	1970	1.550	.880	.794	1.008	1.112	1.485	2.037
	1980	1.289	.936	.904	.975	1.035	1.242	1.658
	1990	1.324	.936	.881	1.004	1.106	1.293	1.579
	2000	1.192	.964	.930	1.009	1.064	1.174	1.342
	2010	1.196	.965	.910	1.053	1.096	1.192	1.235
	2017	1.169	.972	.922	1.056	1.087	1.165	1.199
	Total	1.295	.942	.891	1.018	1.083	1.265	1.546
	Time Varying Level							
Time Varying Level	1970	1.467	.830	.745	.891	1.083	1.393	2.001
	1980	1.262	.917	.892	.930	1.014	1.219	1.584
	1990	1.298	.924	.873	.982	1.085	1.269	1.516
	2000	1.182	.962	.935	.982	1.072	1.167	1.304
	2010	1.196	.965	.910	1.053	1.096	1.192	1.235
	2017	1.169	.972	.922	1.056	1.087	1.165	1.199
	Total	1.292	.940	.898	.988	1.076	1.254	1.583