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Income Inequality across the Rural-Urban Continuum in the United States, 1970–2016

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1. Introduction

After decades of stable or declining income inequality during the mid-twentieth century, income disparities across the United States have increased sharply in recent decades. Beginning in the 1970s, the sustained declines in income inequality that had occurred since the late 1920s were reversed, rising to near-record highs over subsequent years (Bluestone and Harrison 1988; Morris and Western 1999; Nielsen and Alderson 1997; Saez 2017). Although families in the top 10 percent of the income distribution accounted for less than 35 percent of all U.S. income through much of the 1950s and 1970s, these top families' share had increased to more than 50 percent by 2012 (Saez 2017). The United States now has the fourth-highest level of income inequality among OECD countries, behind only Mexico, Chile, and Turkey (OECD 2018). This is an “age of extremes” in which resources and opportunities are concentrated among an increasingly selective segment of the population (Massey 1996; Saez 2017). Indeed, high levels of income inequality selectively diminish the life chances of some populations while providing access to economic and educational opportunities, and political power, to privileged others (Duncan 2014; Reardon and Bischoff; Smith 2012).¹

The overall contours of income inequality dynamics at the national level are well documented (Morris and Western 1999; Piketty and Saez 2003; Saez 2017; Western, Bloome, and Percheski 2008). However, less is known about inequality at the sub-

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¹As Louis Brandeis told President Woodrow Wilson early in the 20th century, “We must make our choice. We may have democracy, or we may have wealth concentrated in the hands of a few, but we can't have both.” (Lonergan 1941: 42).

national level, within localities (for recent exceptions see Butler et al. 2020; Peters 2013; VanHeuvelen 2018). Yet it is in these spaces where most social and economic interactions take place, and therefore where inequality is most likely to be perceived in social interactions and to influence individuals' behaviors and outcomes (Brush 2007; Duncan 2014; Lopez 2005; McLaughlin, Stokes, and Nonoyama 2001). The limited attention to the sub-national scale has also restricted knowledge about whether and how trends in income inequality may vary between rural and urban areas, and among different types of rural and urban localities. Such differences are expected given the major, but spatially heterogeneous economic and demographic changes that have occurred in the past half-century (Bailey et al. 2014; Brown and Swanson 2004; Johnson 2020; Lichter 2012; Lichter and Brown 2011; Manduca 2019; Vias and Nelson 2006; Yang and Jensen 2015). Accordingly, this study focuses explicitly on how county-level income inequality in the United States varies across the rural-urban continuum, and how these patterns have changed over the past fifty years.

The overall goals of this paper are to describe levels of within-county income inequality in the rural United States since 1970, draw comparisons with income inequality dynamics in urban areas, and describe the exposure of rural and urban residents to high- and low-inequality contexts. Toward these broader goals we address three sets of research questions. First, how do the average levels of income inequality differ between non-metropolitan and metropolitan counties, and across the rural-urban continuum? How have these differentials changed over time, from 1970 to 2016? Second, how have income inequality levels changed within counties over this period? Does the degree of persistence in high and low inequality vary between rural and urban areas? Third and finally, to what degree have rural and urban residents been exposed to high- and low-inequality contexts as a result of where they lived? How have these levels of exposure changed over time? Together, these analyses provide a comprehensive profile of local income inequality among rural and urban places and populations during a nearly five-decade period of increasing economic polarization in the United States.

2. Background

The distribution of household income across the U.S. population has become increasingly skewed over recent decades (Saez 2017), but there is only limited evidence of how these changes have played out at the local level. Historical processes of uneven spatial development have resulted in significant regional disparities in socioeconomic conditions across the United States (Chetty et al. 2014; Iceland and Hernandez 2017; Lichter et al. 2012; Lobao et al. 2007; Thiede et al. 2018). The United States—like other countries—is fragmented into sub-national spaces that differ in terms of their demographic composition and social structure. As a result, the link between national-level trends and local conditions is complex and sometimes tenuous (Manduca 2019; Thiede and Monnat 2016).

Spatial variation in the level of income inequality within sub-national regions or localities (e.g., counties, labor markets) may reflect differences in population characteristics and social structure. First, given systematic differences in earnings across numerous socioeconomic axes (e.g., race and ethnicity, educational attainment, age), levels of income inequality within a given locality can be influenced by the representation of such groups in a

local population (Huffman and Cohen 2004; Iceland 2019; Leicht 2008; Tamborini et al. 2015). These compositional influences operate in a somewhat mechanistic manner. For example, in the presence of a positive correlation between educational attainment and income, a hypothetical population in which all earners have less than a high school degree will have lower levels of income inequality than a population in which one-in-ten earners have graduate degrees and nine-in-ten earners have less than a high school degree. This and similar stylized examples of compositional effects find support in the literature published to date. For example, Moller and colleagues' (2009) analysis of within-county income inequality between 1970 and 2000 shows statistically and substantively significant associations between the educational, racial, and sex composition of county populations and the level of inequality. McLaughlin (2002) found that similar compositional variables were correlated with changes in county-level income inequality between 1980 and 1990; and Peters (2013) found that counties with larger ethno-racial minority populations were more likely to be characterized by high levels of income inequality.

Inequality levels may also be influenced by a locality's social and economic structure. Social scientists have increasingly recognized that geographic "place" has implications for economic development (Brown 2019; Soja 1989). Places vary with respect to a number of conditions that influence how income (and other resources) are distributed, including the rigidity of social hierarchies, the capacity of local institutions to provide education and health care, local industrial-occupational structure, and other labor market institutions that affect employment and the economic returns to work (Duncan 2014; Lobao et al. 2007; Nielsen and Alderson 1997; VanHeuvelen 2018). The salience of such place characteristics has been demonstrated in multiple empirical analyses, which show that structural factors such as union density, educational spending, and industrial structure influence levels of inequality at the sub-national level (McLaughlin 2002; Moller et al. 2009; VanHeuvelen 2018). From this perspective, place is not simply a passive unit for aggregating populations but rather has a causal role in producing and reproducing inequality (Soja 1989).

In this study we are particularly interested in understanding how levels of, and changes in, inequality vary between rural and urban areas. Settlement type, so defined, represents a distinctive place characteristic: population composition and social structure vary systematically across the rural-urban continuum (Lichter and Brown 2011; Lichter and Ziliak 2017); and spatial isolation and population density—the ecological signatures of rurality and urbanicity—may also have independent associations with income inequality (Butler et al. 2020; Moller et al. 2009). For one, rural and urban populations vary with respect to a number of demographic characteristics and processes that are likely to be correlated with the distribution of income. For example, non-metropolitan counties have historically been characterized by lower average levels of racial and ethnic diversity than metropolitan areas and have also recently experienced unique patterns of growth in such diversity (Lee and Sharp 2017; Lichter 2012).² The populations of rural and urban communities have also been differentially affected by internal migration. For example, rural areas have experienced net out-migration to urban areas since 1980, and this process has

²We acknowledge major regional variation in these patterns. For example, many non-metropolitan counties in the South are characterized by high levels of ethno-racial diversity.

often been selective of younger persons with higher education and other aspects of human capital (Carr and Kefalas 2009; USDA ERS 2017). Selective migration processes have also affected urban areas: first as highly-educated, high-earning populations disproportionately left central cities for the suburbs; and more recently as some large cities experience gentrification and the displacement of long-term low-income residents with higher-income families (Hwang 2015; South and Crowder 1997; Wilson 1996).

Multiple dimensions of social structure also vary systematically across the rural-urban continuum. As just one example, the industrial composition of rural and urban economies has been historically quite different and undergone distinctive changes over time. Many rural areas across the Mississippi Delta, Appalachia, the Rio Grande Valley, and the mid-South have been dependent on resource-based industries such as mining, plantation agriculture and forestry, and non-durable manufacturing. Employment in these sectors has often been characterized by relatively few well-paying jobs occupied by the owners and managers of capital alongside numerous low-wage, low-skill production jobs (Falk and Lobao 2003; Gibbs et al. 2005; Vias and Nelson 2006). Moreover, since such low-wage, low-skill jobs are the most vulnerable to offshoring, even this precarious employment has become scarcer in rural economies over time, potentially exacerbating inequality (Glasmeier and Salant 2006). Offshoring and broader patterns of de-industrialization and de-skilling have also affected metropolitan areas, particularly in core economies where legacy manufacturers have cut back employment or closed entirely under the pressure of technological change, global competition, and organizational realignment (Autor and Dorn 2013; Brady and Wallace 2001; VanHeuvelen and Copas 2019). These and other dimensions of social structure shape inequality by incentivizing select populations to reside (or leave) a given community and, relatedly, affecting the distribution of income and other resources among residents.

In addition to rural-urban differentials in population composition and social structure, rurality and urbanicity may be associated with income inequality on their own terms. Prior work has suggested that sub-national income inequality may vary systematically between rural and urban areas (e.g., Levernier et al. 1998; McLaughlin 2002; Moller et al. 2009, Nord 1980). For example, VanHeuvelen (2018) draws on the work of Simon Kuznets and other scholars to suggest that urban areas should experience higher levels of inequality than rural places. They argue that the former places are most likely to be characterized by dynamic economies, highly-educated labor supplies, and other characteristics associated with the attainment of high pay that skews the income distribution. For rural areas, the implication is that access to well-paying commuter jobs may elevate inequality in communities that are adjacent to metropolitan areas vis-à-vis their more isolated counterparts where virtually no well-paying jobs are available. Empirically, however, the association between rurality and sub-national income inequality has been inconsistent and sometimes contradictory. Moller et al.'s findings (2009) suggest the need to distinguish between cross-sectional variation across the rural-urban continuum—according to which rural counties have higher inequality—and longitudinal variation in the degree of urbanization within a county—according to which urbanization is positively associated with the degree of inequality. However, more recent estimates suggest that even these conclusions are tenuous (Butler et al. 2020; VanHeuvelen 2018).³ We therefore take the direction of variation in inequality along the rural-urban continuum as an empirical question.

Our updated, descriptive portrait of income inequality across the rural-urban continuum is merited for at least three major reasons. First, we fill a gap in evidence about changing rural-urban differentials in income inequality during a period of growing macro-level inequalities.⁴ Prior work has either not focused explicitly on rural-urban comparisons, produced estimates for only some of the 1970–2016 time period we study here, or focused on alternative geographic scales (e.g., Hertz and Silva 2019; McLaughlin 2002; Peters 2013). Our study therefore represents the only known county-level analysis to track absolute levels of income inequality across the rural-urban continuum since 1970, when the declining income disparities of the mid-twentieth century began to reverse. Second and relatedly, the United States has undergone major socioeconomic and demographic changes over the nearly fifty-year period that we study here. These changes have been especially pronounced in rural America, where communities have variously experienced unprecedented industrial restructuring, population losses and aging, and growth in racial and ethnic diversity (Johnson and Lichter 2019; Johnson 2020; Lichter 2012; Thiede et al. 2017; Vias and Nelson 2006). A rigorous descriptive assessment of how inequality has (or has not) changed over a time period characterized by such dramatic transformations is an important first step toward developing a causal understanding of these processes.⁵ Third and finally, an updated account of local inequality levels across the United States—and particularly one that tracks populations' exposure to inequality—is important given the second-order consequences of inequality levels in one's place of residence. Exposure to high inequality in particular is correlated with a range of adverse outcomes, including drug-related mortality, firearm homicides, child maltreatment, and restricted access to the democratic process (Eckenrode et al. 2014; Monnat 2018; Rowhani-Rahbar et al. 2019; Smith 2012). Understanding where and to what degree sub-national inequality has increased (or decreased) over time should therefore be of interest to a wide range of stakeholders.

3. Objectives

This study's overarching goal is to describe trends in within-county income inequality in the rural and urban United States from 1970 to 2016. Our analyses address three specific objectives. First, we estimate and compare levels of within-county income inequality in non-metropolitan and metropolitan counties, as well as across a more detailed typology of counties that captures the rural-urban continuum. Second, we assess whether and how income inequality levels have persisted within counties over time and we describe patterns of persistence between and within the non-metropolitan and metropolitan sectors. Third, we evaluate whether and how the degree of exposure to high- and low-inequality contexts has changed over time among the populations living along the rural-urban continuum. By addressing these questions, we provide a statistical portrait of income inequality dynamics in

³Peters (2013) finds that county population density is inversely associated with membership in “average” or “above average” inequality categories relative to the “persistent equality” category. However, these categories are based on the cluster analysis of county-level inequality measures that have been peer-demeaned, with peers defined by whether a county is in the core of a metropolitan area, the suburbs of a metropolitan area, or a non-metropolitan area. While perhaps merited, this approach precludes substantively meaningful comparisons with the other studies cited above.

⁴Our use of the term “rural-urban differentials” refers to both overall non-metropolitan versus metropolitan comparisons, as well as comparisons across multiple types of non-metropolitan and metropolitan counties.

⁵As should be clear throughout the paper, we do not offer such a causal analysis here.

rural and urban America and shed new insights into localized patterns of income inequality during an era of increasing stratification nationally.

4. Empirical strategy

4.1. Data and measures

We produce estimates of within-county income inequality using data from the U.S. Decennial Census and American Community Survey (ACS). Specifically, we use IPUMS-NHGIS to extract county-level data on household income from the four Decennial Censuses conducted from 1970 to 2000, as well as the 2006–2010 and 2012–2016 5-year estimates from the ACS (Manson et al. 2018). We use the 5-year estimates given our interest in rural counties with small populations, for which the 1- and 3-year estimates are considered unreliable.⁶ The dataset includes all counties (and equivalent units) in the contiguous United States, which we harmonize to account for changes in county boundaries over time.⁷ These data provide information on the number of households that fall within a defined household income range (e.g., \$0–\$9,999, \$10,000–\$19,999, ... \$45,000+) for each county and each year.⁸ To measure population exposure to high- and low-inequality contexts, we draw on the same data sources to measure the total population size of each county for each time point in the study.

We use these data to estimate the Gini coefficient of household income inequality within counties. The Gini coefficient is a commonly used measure of inequality (Allison 1978). Ranging from 0 (perfect equality) to 1 (perfect inequality), this indicator corresponds to the area between the Lorenz Curve—which plots the cumulative distribution of income against the corresponding cumulative share of the population—and the theoretical line of equity produced when income is distributed evenly across the population of interest. Since our study necessarily uses household income data, the Gini coefficient is capturing the distribution of household income across the population of households rather than the distribution of personal income among individuals.

The Gini coefficient and related measures of income inequality are typically calculated with continuous measures of income, but the public-use data that we use provide only binned income measures as described above. Because we cannot observe the true distribution of households within each income bin, it must be estimated. To do so we use the robust Pareto midpoint estimator developed by von Hippel, Scarpino, and Holas (2016). This approach assigns all cases within a given income bin to the midpoint of that bin, except for the

⁶Uncertainty around even the 5-year ACS estimates is high for counties with small populations and for small geographic units, such as census tracts (Folch et al. 2016). Some scholars have attempted to address this issue in regression analyses by reweighting the ACS to give less weight to counties (or other units) where populations are smaller and errors larger (e.g., weighting by the logarithm of total population or inverse of coefficient of variation; Monnat 2017). We do not include such weights in the first part of our analysis since they would shift the interpretation of results from capturing trends in the average level of county-level inequality over time to capturing populations' exposure to county-level inequality. We address the latter question explicitly in Section 5.4.

⁷We account for boundary changes by creating the smallest-possible geographic units with consistent boundaries over time. For example, while part of Yuma County, Arizona was taken to create La Paz County in 1983, we treat these two counties as a single unit for our analysis.

⁸Loving County, TX is missing household income data for 1970. To impute the value for Loving County's Gini coefficient in this year, we assumed a linear trend and used the values of Loving County's Gini in 1980 and 1990 to impute the missing value in 1970. Sensitivity checks confirmed that the results for the descriptive statistics in this paper remained highly consistent whether or not this imputed value was included.

top income category, which lacks a defined upper bound. The value for this latter bin is estimated by fitting a Pareto curve to the top two income categories and then finding the harmonic mean of the top bin (von Hippel et al. 2016; von Hippel and Powers 2019).

Using these estimates, we analyze levels of, and changes in, within-county income inequality between and within the non-metropolitan and metropolitan United States from 1970 to 2016. We define counties' metropolitan status using the U.S. Office of Management and Budget (OMB) metropolitan classification system. We apply the OMB delineations from 1993 throughout the analysis, such that counties' metropolitan classifications do not change over the study.⁹ We take this fixed approach to ensure that reclassification does not confound our estimates of rural-urban differences over time (Fuguitt, Heaton, and Lichter 1988; Johnson and Lichter 2020). The 1993 delineation was selected since it represents the approximate mid-point of the period we study and will therefore, on average, minimize the misclassification of counties whose metropolitan status changed over time. According to this delineation, 2,264 counties are classified as non-metropolitan and 812 as metropolitan.

To examine variation within non-metropolitan and metropolitan categories, we use a modified version of the United States Department of Agriculture (USDA) Economic Research Services' (ERS) 1993 rural-urban continuum (RUC) codes. The 1993 RUC codes categorize counties according to the size of their urban population (non-metropolitan counties) or the size of the metropolitan area in which they are embedded (metropolitan counties). Among the largest metropolitan areas, the RUC codes indicate whether the county was a central or outlying component. The codes also distinguish between non-metropolitan counties that are and are not adjacent to metropolitan areas, but we collapse adjacent and non-adjacent non-metropolitan counties by population size to allow for a parsimonious typology.¹⁰ The result is a six-category typology as follows: (1) central counties of metropolitan areas with 1 million or more residents; (2) outlying counties of metropolitan areas with 1 million or more residents; (3) counties in metropolitan area of less than 1 million residents; (4) non-metropolitan counties with an urban population of 20,000 or more; (5) non-metropolitan counties with an urban population of 2,500 to 19,999; and (6) non-metropolitan counties with less than 2,500 urban residents. We refer to these categories as spanning the rural-urban continuum. throughout the paper.

4.2. Methods

Our analyses proceed as follows. First, we describe levels of between-household income inequality within non-metropolitan and metropolitan counties, as well across the rural-urban continuum, for each period included in our data. We calculate the mean and standard deviation of within-county inequality levels for each group of counties and period, and then map levels of inequality in 1970 and 2016 to describe broader regional patterns. Second, we analyze differences in the magnitude of absolute within-county change in income inequality between 1970 and 2016. Here again, we focus on patterns in the mean and standard

⁹The 1993 delineation is based on the results of the 1990 Census.

¹⁰This decision was informed by preliminary analysis, which indicated that variation in inequality was greater according to population size than metropolitan-area adjacency.

deviation of these changes. Consistent with the first step in our analysis, we examine spatial patterns by mapping the change in counties' Gini coefficient between 1970 and 2016.

Third, we identify areas where inequality has been persistently high or low. We measure such persistence by calculating the number of periods a county was characterized by low or high levels of inequality between 1970 and 2016. We respectively define low and high inequality as cases where the Gini coefficient was greater than 1.5 standard deviations below and above the mean for all county-year observations in our dataset. The approximate values for the 1.5 standard deviation thresholds are 0.36 and 0.48 for the low- and high-inequality cases, respectively. We define moderate inequality as the remaining values between and inclusive of the 1.5 standard deviation thresholds. Across all county-years of our data, approximately 5.2 percent of counties fall below the 0.36 threshold and 6.8 percent of counties above the 0.48 threshold. Since these thresholds are ultimately somewhat arbitrary, we assess the sensitivity of our findings by replicating the main analysis of trends in local inequality using alternative thresholds as shown in Tables A1–A4 of the appendix.¹¹ Fourth, we examine the persistence of local inequality by calculating the probability of transitioning between high, moderate, and low inequality classes between 1970 and 2016. That is, we track the association between a county's position at the start of the study, in 1970, and its level of inequality 46 years later in 2016.

Fifth, we analyze levels of, and changes in, populations' exposure to high and low inequality. For each year, we calculate the share of the non-metropolitan and metropolitan populations that reside in high- and low-inequality counties as defined above. We calculate similar figures for the populations within each of the six county types, and then analyze patterns of change in exposure to high and low inequality from 1970 to 2016.

5. Results

5.1 Levels and trends in within-county income inequality

We begin by analyzing patterns in the level of within-county income inequality across the rural-urban continuum from 1970 to 2016. We present descriptive statistics (Table 1) and plot trends in the mean Gini coefficient by period for all metropolitan and non-metropolitan counties (Figure 1), and for each of the county groups in our six-category typology (Figure 2). This analysis yields five main findings. First, the mean level of income inequality has been higher in non-metropolitan than metropolitan counties across the entire study period. The mean Gini coefficient was 0.427 in non-metropolitan counties and 0.406 in metropolitan counties across all periods. At no point between 1970 and 2016 has the average level of within-county income inequality across all metropolitan counties exceeded that across all non-metropolitan counties, nor have the means of any of the metropolitan sub-groups exceeded those of any non-metropolitan sub-group. It is important to note, however, that disparities between metropolitan and non-metropolitan counties were much larger during the first decades of the study (see below).

¹¹When comparing the results of the sensitivity analyses with those presented in the main text, the same general trends remain consistent. For example, non-metropolitan counties are more likely to experience persistent high-inequality and less likely to experience low-inequality than metropolitan counties.

Second, average levels of income inequality have tended to vary systematically across the rural-urban continuum, producing a gradient whereby the degree of inequality is positively correlated with rurality. Throughout the study period, the most urbanized non-metropolitan counties have, on average, had lower levels of inequality than the least urbanized places. In 1990, for example, the mean Gini coefficient was 0.402 for central counties in large metropolitan areas, 0.413 for medium and small metropolitan counties, 0.423 for highly urbanized non-metropolitan counties; and 0.429 for the least urbanized non-metropolitan counties. The peripheral counties in large metropolitan areas represent the key exception to this pattern: from 1980 onward, these counties were characterized by lower average levels of income inequality than both central counties in large metropolitan areas and counties in medium and small metropolitan areas. This result suggests that the metropolitan periphery experienced distinctive demographic and socioeconomic conditions over recent decades vis-à-vis other parts of metropolitan America and perhaps the country as a whole.

Third, average levels of county-level inequality increased from 1970 to 2016 in both metropolitan and non-metropolitan areas, including among all six of the sub-categories of counties that we consider. In no instance did we observe an overall decline in average inequality levels from the start to end of this period. Importantly, however, a fourth finding is that the rural-urban gradient in inequality levels has diminished over time. The absolute gap in mean income inequality between all non-metropolitan and metropolitan counties declined by nearly 80 percent, from 0.039 in 1970 to 0.008 in 2016. A similar pattern was observed when non-metropolitan counties are decomposed according to their location along the rural-urban continuum, as differences according to population size largely disappear by 2016. For example, the difference between the least urbanized non-metropolitan counties and the central counties of the largest metropolitan areas diminished from 0.068 in 1980 to essentially zero (0.001) in 2016. Again, the key exception is among outlying counties in the largest metropolitan areas: the average level of income inequality in these places remained relatively low and has therefore lagged far below the other groups. Still, the overall pattern of rural-urban convergence has been driven by disproportionate increases in mean inequality within metropolitan areas rather than declines among non-metropolitan counties. While the average level of inequality in non-metropolitan counties decreased slightly during two periods—1970–1980 and 2000–2010—the overall 1970–2016 period was still characterized by a modest increase in average inequality among non-metropolitan counties.

Fifth, there is considerable but decreasing variation in mean inequality levels. The standard deviation of county Gini coefficients declined from 1970 to 2016 across all groups of counties we study. For example, the standard deviation of the Gini coefficients of metropolitan counties declined from 0.036 to 0.029, and among non-metropolitan counties the standard deviation declined from 0.041 to 0.035. These patterns suggest that increases in the average level of inequality were matched by increased uniformity of those levels. A corresponding increase in the range of inequality levels was observed in non-metropolitan counties from 1970 to 2016 (from 0.277–0.620 in 1970 to 0.325–0.712 in 2016, results not shown), but the range in metropolitan counties decreased (from 0.264–0.493 in 1970 to 0.346–0.539 in 2016, results not shown). Of course, these results may simply reflect the presence of outliers and should therefore be interpreted with some caution.

We next produce maps to examine geographic variation in the levels of within-county income inequality across the United States as a whole, and among non-metropolitan and metropolitan counties. County-level income inequality levels for 1970 and 2016 are shown in Figure 3, with metropolitan counties outlined in black in each map for reference. The map of inequality levels in 1970 suggests a bifurcation among non-metropolitan counties that falls largely along regional lines. During this period, many of the highest-inequality counties in the non-metropolitan United States—and the country as a whole—were located in the southeastern part of the country (including the Mississippi Delta and Appalachia), the south-central Plains, the desert Southwest, and, more sporadically, parts of the upper Midwest. By contrast, levels of inequality were distinctively lower in the non-metropolitan Northeast, southern portions of the Mountain West, and the West Coast (see appendix Table A5 for formal tests of inter-regional differences).¹² Inequality within metropolitan counties also appears lower than in most non-metropolitan counties, and this is often true even in regions of the country where inequality was generally high. In these places, the lightest shades of gray (denoting lower inequality) in many metropolitan counties stand out against the darker grays (denoting higher inequality) of surrounding non-metropolitan areas. With that said, the limited number of metropolitan counties with high levels of inequality were almost exclusively located in the regions of the country with the highest levels of inequality more broadly.

The map of within-county inequality in 2016 reveals a considerably different spatial pattern. By this time, the regional differences shown in 1970 had largely disappeared and high levels of income inequality had diffused throughout the United States. The declining gap in income inequality between non-metropolitan and metropolitan areas shown in Figure 1 is also reflected throughout the country rather than being concentrated in particular regions (see appendix Table A6 for formal tests of inter-regional differences).¹³ While a number of regions were characterized by levels of inequality that are low by 2016 standards—including parts of the mountain West, the central and northern Plains, and the Midwest—few counties in these regions were characterized by the absolutely low levels of inequality observed in many parts of the country in 1970. Even in these relatively low-inequality regions, numerous counties with exceptionally high levels of inequality can be found. It is also notable that by 2016 many metropolitan counties had high absolute levels of income inequality—including counties in metropolitan areas adjacent to or within some of the few remaining low-inequality regions. Whereas metropolitan counties were often ‘islands’ of low inequality amidst region with high non-metropolitan inequality in 1970, the opposite appears true in 2016.

¹²We formally tested for inter-regional differences in 1970 by estimating a linear regression model in which the Gini coefficient of county i is a function of its RUC code and region as defined by the U.S. Census Bureau. Net of rurality and relative to the reference region of the Northeast, inequality is statistically higher in the Midwest ($\beta = 0.014$), South ($\beta = 0.042$), and West ($\beta = 0.008$). See appendix Table A5 for full results.

¹³We also formally tested for inter-regional differences in 2016 by estimating similarly-specified regression models as described in the prior footnote. Net of rurality and relative to the reference region of the Northeast, inequality is statistically higher in the South ($\beta = 0.020$), statistically lower in the Midwest ($\beta = -0.009$), and not statistically different in the West. A simple comparison of point estimates between the results for 1970 and 2016 are consistent with the claim in the text that inter-regional disparities have diminished over time. See appendix Table A6 for full results.

5.2 Changes in within-county income inequality, 1970 to 2016

We next examine patterns of absolute change in within-county inequality between 1970 and 2016. We produce descriptive statistics of the change in the Gini coefficient between 1970 and 2016 for non-metropolitan and metropolitan counties, and across the rural-urban continuum (Table 2). We also map the geographic distribution of these changes across U.S. non-metropolitan and metropolitan counties (Figure 4). The average absolute increase in within-county inequality from 1970 to 2016 was, at 0.041 points (SD = 0.035), considerably higher among metropolitan counties than among non-metropolitan counties, where the average increase was just 0.010 points (SD = 0.039). These differences are consistent with the overall convergence between non-metropolitan and metropolitan areas over the study period.

We also find differences in the degree of within-county change across the rural-urban continuum. The largest average absolute increases occurred in the central counties of large metropolitan areas (0.068 points, SD = 0.030), followed by counties in small- and medium-sized metropolitan areas (0.037 points, SD = 0.032) and highly urbanized non-metropolitan counties (0.034, SD = 0.026). Outlying counties of large metropolitan areas had, on average, somewhat smaller increases of 0.023 points (SD = 0.034), followed by moderately urbanized non-metropolitan counties (0.011, SD = 0.033). The least urbanized non-metropolitan counties experienced essentially no change (0.001 points, SD = 0.040) on average from 1970 to 2016.

These overall changes in local income inequality also reflect a regional pattern, as illustrated in the map of the changes in the Gini coefficient from 1970 to 2016 for each county (Figure 4). This map highlights the general tendency toward increased within-county inequality over the period, but also underlines the diverse trajectories of counties. Indeed, the range of changes in the county Gini coefficient from 1970 to 2016 was -0.207 to 0.262 among non-metropolitan counties and -0.084 to 0.135 among metropolitan counties (results not shown). The implication is that non-metropolitan counties were characterized by both smaller average changes in inequality over this period and a considerable number of outliers. The map in Figure 4 also reveals that, broadly, the largest decreases in income inequality occurred in the central regions of the United States, from south-central Texas to northern North Dakota. However, even in these regions, most metropolitan counties were characterized by large increases in inequality. Such increases in inequality were especially marked in the Great Lakes region, New England, the Carolinas, and along the West Coast. On the one hand, the widespread increases in inequality in these regions may simply reflect the fact that there have been secular increases in inequality in metropolitan areas and these regions are more urbanized than the central part of the country. On the other hand, it is notable that many of the non-metropolitan counties in the western and eastern United States also experienced increases in inequality, which suggests that these patterns may be driven by socioeconomic processes operating at the regional level.

5.3 Persistence of within-county income inequality over time

In addition to studying the average levels of change in inequality over time, we also analyze the persistence (or lack thereof) of high and low inequality among various categories of

counties. Again, we define high- and low-inequality counties as those with Gini coefficients of 0.48 and 0.36, respectively, corresponding to 1.5 or more standard deviations above and below the mean of all county-years in our study. We begin this analysis by describing the distribution of counties according to the number of times that they were characterized by high and low inequality throughout the study period (Table 3). Across the six time points in our data—which span nearly fifty years—non-metropolitan counties were much more likely than metropolitan counties to be characterized as high inequality at least once, as well as to be characterized by high inequality across multiple time points. Nearly 95 percent (94.8%) of metropolitan counties were never classified as high inequality between 1970 and 2016, compared with less than three-quarters (74.8%) of non-metropolitan counties. In contrast, 6.9 percent of non-metropolitan counties had high levels of inequality for at least three of the six periods we consider, which was more than twice the share of metropolitan counties (2.4%) characterized by such persistently high inequality. We visualize these results with the map of persistently high-inequality counties, so defined, in Figure 5. Such counties are concentrated in the Southeast, Southwest, and south-central Plains, as well as in a cluster in Appalachia. There is also a small number of persistently high-inequality non-metropolitan counties in the West. By contrast, metropolitan counties (delineated with black outlines) were much less likely to have experienced persistently high inequality. It is also worth noting that patterns of persistent low inequality largely mirror those of high inequality, with a larger share of metropolitan counties (10.3%) than non-metropolitan counties (1.6%) experiencing persistently low inequality.

These overall differences in the persistence of high and low inequality mask important variation among non-metropolitan and metropolitan counties. Among non-metropolitan counties, the least urbanized and moderately urbanized counties had the highest rates of persistently high inequality: 8.7 percent of the former and 6.3 percent of the latter. These figures exceed the 4.8 percent of highly urbanized non-metropolitan counties with persistently high inequality, so defined. Less than three percent of all metropolitan counties were characterized by persistently high inequality, but rates ranged from 4.8 percent among the central counties of the largest metropolitan areas to zero among the peripheral counties in such areas.

Low inequality was uniformly rare for all types of non-metropolitan counties, with between 10.6 (moderately urbanized) and 13.1 (highly urbanized) percent of such counties experiencing one or more spell of low inequality; and between 1.0 (least urbanized) and 1.8 (moderately urbanized) experiencing persistently low inequality. However, while nearly half of counties in the largest metropolitan areas—both central (50.9%) and outlying (48.5%)—experienced at least one spell of low inequality, just under one in four counties (23.4%) in small and moderate metropolitan areas did so. Persistently low inequality was similarly rare among such counties (4.9%). As such, these results suggest that low inequality has been disproportionately concentrated in large metropolitan areas.

We further examine the persistence of high and low inequality by assessing whether counties' initial level of inequality (in 1970) is correlated with its level of inequality at the study's end point in 2016. For non-metropolitan and metropolitan counties overall, and for each of the six groups across the rural-urban continuum, we tabulate the shares of

counties that started in each level of inequality in 1970 that were respectively characterized by low, moderate, and high levels of inequality in 2016 (Table 4). These figures allow us to assess how the probability of transitioning across inequality categories varied between non-metropolitan and metropolitan areas, and across the rural-urban continuum. Our results suggest that one third (66.7%) of the metropolitan counties that were classified as high inequality in 1970 remained so in 2016, and this degree of persistence is considerably higher than among non-metropolitan counties (34.2%). Given that only three metropolitan counties were classified as high inequality in 1970, however, we would caution against drawing strong conclusions. Counties that were classified as moderate inequality in 1970 were most likely to remain classified as such in 2016. More than 90 percent of both the non-metropolitan and metropolitan counties that were classified as moderate inequality in 1970 remained so in 2016, and nearly all of the remaining counties transitioned from moderate to high inequality. The only exceptions were the 0.9 percent of the non-metropolitan and metropolitan counties (respectively) that had been classified as moderate inequality in 1970 and transitioned to low inequality in 2016. Finally, we examine patterns of transition from low inequality. Here again we find very little in the way of overall differences between non-metropolitan and metropolitan counties: among both groups, nearly all counties that had initially been classified as low inequality had transitioned to moderate or high inequality by 2016. Only a limited proportion of metropolitan and non-metropolitan counties were classified as low inequality in both periods.

These patterns are largely consistent when counties are decomposed across the six-category typology representing the rural-urban continuum. Differences in transition patterns continue to be a matter of degree rather than kind, but in some cases are substantial in that respect. For example, while 100 percent of the (few) central counties in large metropolitan areas that had been characterized as high inequality in 1970 remained so in 2016, just 40.0 percent of the highly urbanized non-metropolitan counties that were classified as high inequality in 1970 remained so in 2016. This percentage was even smaller among the least urbanized non-metropolitan counties classified as high inequality in 1970, among which just 26.3 percent remained in 2016. We also observe differences with respect to the inequality trajectories of counties that started (in 1970) with moderate levels of inequality. Nearly 10 percent (9.7%) of the least urbanized non-metropolitan counties classified as moderate inequality transitioned to high inequality in 2016. This rate is higher than the 6.7 percent of highly urbanized non-metropolitan counties that transitioned from moderate inequality in 1970 to high inequality by 2016, but smaller than the 16.7 percent of the central counties in large metropolitan areas with moderate inequality at baseline that made this transition. By contrast, none of the peripheral counties in large metropolitan areas that were classified as moderate inequality transitioned to high inequality in 2016—and a full 5.8 percent transitioned to low inequality.

It is important to note that the percentages referred to above mask differences in the number of counties transitioning from one level of inequality to the next, as well as in the actual magnitude of change. We therefore also illustrate counties' transitions across levels of inequality from 1970 to 2016 by plotting each counties' Gini coefficient in 1970 (vertical axis) against its 2016 value (horizontal axis) for each of the six groups across the rural-urban continuum (Figure 6). These plots have been overlaid with horizontal and vertical lines to

denote the high and low thresholds defined above. Similar to the results shown in Table 4, a county's initial level of inequality in 1970 is fairly predictive of its inequality level in 2016.¹⁴ Also consistent with our prior findings, virtually all of the counties characterized by low inequality in 1970 had transitioned to moderate or high levels of inequality by 2016.

5.4 Populations' exposure to income inequality

Our final analysis examines the extent to which non-metropolitan and metropolitan populations have resided in high- and low-inequality communities over the past five decades. Since populations are distributed unevenly across counties, this part of the study is an important corollary to our previous analyses that treated counties as the unit of analysis. Indeed, from a policy perspective, one could argue that the degree of populations' exposure to high- or low-inequality is equally or more important than the number of localities characterized by such economic conditions. We address this question by calculating the share of the non-metropolitan and metropolitan populations, as well as the sub-populations defined by our 6-category typology, that resided in high- and low-inequality counties during the six time points in our data (Table 5).

Overall, the share of the non-metropolitan population located in high-inequality counties increased by less than two percentage points between 1970 and 2016, from 5.7 percent in 1970 to 7.6 percent in 2016. This relatively small uptick was dwarfed by a 7.2 percentage point increase in the share of the metropolitan population located in high-inequality counties, from 1.0 to 8.2 percent. By 2016, a larger (+0.6 percentage points) share of the metropolitan population lived in high-inequality contexts than the non-metropolitan population. This figure represents a reversal from the 4.7 percentage-point non-metropolitan disadvantage in population exposure to high inequality that was observed in 1970. The growing exposure to high-inequality contexts within the metropolitan population was driven largely by inequality and population change in the central counties of very large metropolitan areas—where the share of the population exposed to high local income inequality increased from 1.6 to 12.6 percent—and counties in small- and moderate-sized metropolitan areas—where the corresponding population shares increased from 0.2 to 3.0 percent. A negligible share of the population in peripheral counties of very large metropolitan areas resided in high-inequality contexts across the study period.

Increases in the share of the non-metropolitan population exposed to high-inequality contexts were seemingly driven by change within highly urbanized non-metropolitan counties, and—to a lesser extent—moderately urbanized non-metropolitan counties. Increases were most pronounced in the most urbanized non-metropolitan counties, where just 1.9 percent of the population resided in high-inequality counties in 1970 but 5.7 percent of the population lived in such places in 2016. Comparatively, increases in exposure to high inequality were more modest among moderately urbanized non-metropolitan counties (1.9 percentage points), and this trend was reversed among the least urbanized non-metropolitan

¹⁴The slopes of the fitted lines are all statistically significant at the $p < .001$ threshold and as follows: central counties of large metropolitan areas ($r = 0.665$), peripheral counties of large metropolitan areas ($r = 0.391$), counties in medium and small metropolitan areas ($r = 0.430$), highly urbanized non-metropolitan counties ($r = 0.648$), moderately urbanized non-metropolitan counties ($r = 0.582$), and the least urbanized non-metropolitan counties ($r = 0.305$).

counties, where exposure to high levels of inequality decreased from 12.2 to 9.8 percent between 1970 and 2016.

Changes in populations' exposure to low inequality were markedly different. By 2016, virtually none of the U.S. population resided in low-inequality counties. As such, the only difference between metropolitan and non-metropolitan counties (and across the rural-urban continuum) that emerges pertain to the baseline (1970) exposure levels. Relatively small shares of the non-metropolitan population were ever exposed to low levels of inequality over the study period, but a substantial percentage of the metropolitan population was located in low-inequality areas for many decades. Indeed, nearly a third of the population in counties within the largest metropolitan areas was exposed to low inequality in 1970, including more than 55 percent of the population in the peripheral of such areas. By 2016, however, this share had fallen to less than seven percent (6.8%). Clearly, the growing number of counties characterized by high levels of income inequality (as shown in Figure 3) has translated into a growing likelihood that people will reside in such places.

6. Discussion and conclusion

Our estimates of within-county income inequality from 1970 through 2016 demonstrated that the well-documented increases in income inequality at the national level are also playing out within many localities. Our study placed renewed attention on comparative patterns of within-county income inequality in non-metropolitan and metropolitan areas and across the rural-urban continuum, which were expected to vary given substantial and heterogeneous economic and demographic changes over recent decades and the plausible independent effects of rurality and urbanicity.

Our results point to five major findings. First, high levels of local income inequality have historically been more characteristic of non-metropolitan than metropolitan areas, with rural counties consistently having the highest average income inequality from 1970 to 2016. Second, levels of within-county income inequality have converged between non-metropolitan and metropolitan areas over time. In other words, the initially negative association between the level of urbanization and the degree of inequality had been largely eliminated by 2016. This convergence was nearly complete by 2016 and has been driven by increases in inequality within metropolitan counties rather than systematic decreases in inequality within non-metropolitan counties. The increase in county-level inequality in metropolitan areas is driven by growing income disparities in the central counties of large metropolitan areas more than changes in the outlying, suburban counties—possibly driven by the selective nature of suburbanization and central-city gentrification during this period. Overall, these patterns raise questions about both the drivers of the rapid increase in metropolitan inequality and the persistence of high inequality among non-metropolitan counties.

Third, the direction and magnitude of change in inequality levels varied dramatically across different regions of the country. In some cases (e.g., the central Plains), we observed widespread declines in inequality despite the nation's overall trend toward greater stratification. Likewise, we found that increases in income inequality within the peripheral

counties of large metropolitan areas lagged noticeably behind all other metropolitan and non-metropolitan counties across the rural-urban continuum. In other cases, the general tendency toward increased inequality was amplified and exceptionally large increases in inequality were observed. Such cases were particularly common in metropolitan areas of the Midwest and along both coasts. These results underscore the salience of spatial heterogeneity in general, and of the commonly observed interaction between rurality and region in particular (Curtis and O'Connell 2017; James and Cossman 2006; Rigg and Monnat 2015; Slack et al. 2009).

Fourth, our findings show that levels of income inequality within counties are relatively persistent over time, except among counties that were at the lower end of the inequality distribution in 1970. A large majority of the counties that started the study period with moderate levels of inequality remained at that level in 2016, and most counties characterized by high inequality in 1970 were classified as either high or moderate inequality in 2016. In contrast, virtually all the counties characterized by low inequality in 1970 had transitioned to moderate or high levels of inequality by 2016.

Fifth and finally, increases in the average level of inequality among counties were paralleled by non-trivial growth in the share of populations residing in high-inequality places and thus potentially subject to the adverse social and epidemiological effects of such places (Eckenrode et al. 2014; Monnat 2018; Rowhani-Rahbar et al. 2019). This change has been particularly dramatic among the metropolitan population, which had very little (1.0%) exposure to high inequality (and 30.0% exposure to low inequality) in 1970. It is important to note, however, that substantial percentages of both non-metropolitan and metropolitan populations lived in a high-inequality county in 2016 (8.2% and 7.6%, respectively), and virtually no one lived in a low inequality county by that end line.

Together, these findings provide a new empirical baseline for our understanding of local income inequality dynamics in the rural and urban United States. Given the dearth of research on sub-national income inequality that pays explicit attention to patterns of temporal change across the rural-urban continuum, our analysis should motivate additional research by social scientists interested in spatial inequality. At least four major lines of inquiry emerge from this study. First and perhaps foremost, additional research is needed to understand the determinants—or at least correlates—of the changes in inequality that we track here. Our descriptive study raises questions about the drivers of the rural-urban convergence that we document, as well as about the regionally heterogeneous patterns of income inequality observed among both rural and urban counties. What secular trends or shocks are driving these patterns? For example, our analysis showed that many of the counties that experienced the largest increases in inequality between 1970 and 2016 were located in the “rust belt” and former manufacturing centers in the South, which lost many low-skill, relatively well-paying jobs over the course of this period (Autor and Dorn 2013; VanHeuvelen and Copas 2019). Identifying the effects of such industrial restructuring empirically—including testing for differential effects across the rural-urban continuum—is a direct and necessary extension of our work. Future research should also assess whether the historically high levels of inequality among non-metropolitan counties can be explained by their relative lack of economic diversification and corresponding volatility (Gramling and

Freudenburg 1990; USDA ERS 2019). Finally, we also underline the need to identify the socioeconomic and demographic factors that explain the differences in inequality dynamics between the core and peripheral counties in the largest metropolitan areas, as well as between highly urbanized non-metropolitan counties and the other types of rural counties we consider.

Second, future research should systematically compare levels and changes in income inequality across multiple spatial scales and with different operational definitions of rurality. For example, a comparison of income inequality estimates from the neighborhood to labor market levels would provide insight into the scales at which income inequality manifests and, relatedly, reveal how such estimates are influenced by the choice of unit of analysis. Likewise, a systematic analysis of the respective contributions of changes in within- and between-county income inequality to national-level increases in inequality would help to put the trends we document into a broader context (Thiede and Monnat 2016; Wheeler and La Jeunesse 2008). Given that rural-urban classification systems are often scale-specific (e.g., metropolitan statistical areas are comprised of counties), analyses that use alternative units of analysis or draw comparisons across scale must also think critically about how rurality and urbanity are measured (Isserman 2005).

Third, additional attention to regional disparities in county-level inequality is merited. Future studies should formally compare levels and changes in income inequality within rural and urban counties across regions of the country and work to explain these differences. Substantial inter-regional differences in demographic composition, industrial structure, and institutional legacies provide a rich opportunity for comparative analysis (Duncan 2014). Such attention to regional dynamics has a rich history in rural sociology, including a number of recent studies on poverty, inequality, and health (Curtis and O'Connell 2017; Curtis et al. 2019; Peters 2012; Rigg and Monnat 2015).

Finally, future research should identify the extent to which high levels of local inequality co-occur with other forms of disadvantage—such as concentrated poverty and residential segregation (Reardon and Bischoff 2011; Thiede et al. 2018)—and analyze how these relationships manifest in rural areas specifically. How do poverty and inequality dynamics correspond to each other within counties over time? How might the co-occurrence of poverty and income inequality compound the adverse effects of each for populations exposed to such conditions? We anticipate that our longitudinal summary of county-level income inequality across the rural-urban continuum will spur future research on these and similar questions about sub-national income inequality. Such research is vital to understand how the communities in which most social and economic interactions take place have been restructured during an era of rising macro-level inequalities in the United States, and to determine how this influences life course trajectories of the people living in these places.

Appendix

Table A1.

Percentage of counties characterized by high and low inequality, by county type, alternative definition #1

		0 times	1 to 2 times	3 to 4 times	5 to 6 times
High inequality	Metropolitan total	84.4	9.4	5.2	1.1
	Large metropolitan, central	80.2	9.6	8.4	1.8
	Large metropolitan, periphery	97.7	1.5	0.8	0.0
	Medium and small metropolitan	82.3	11.3	5.3	1.2
	Non-metropolitan total	57.9	24.7	11.3	6.2
	Highly urbanized non-metropolitan	73.4	14.1	7.9	4.6
	Moderately urbanized non-metropolitan	61.0	21.3	11.4	6.3
	Least urbanized non-metropolitan	48.1	33.4	12.1	6.5
Low inequality	Metropolitan total	39.0	36.8	15.0	9.1
	Large metropolitan, central	24.6	46.1	20.4	9.0
	Large metropolitan, periphery	22.0	28.8	25.8	23.5
	Medium and small metropolitan	48.2	35.9	10.5	5.5
	Non-metropolitan total	70.90	20.5	6.6	2.0
	Highly urbanized non-metropolitan	61.8	29.5	6.6	2.1
	Moderately urbanized non-metropolitan	72.2	18.6	6.7	2.6
	Least urbanized non-metropolitan	71.7	20.9	6.4	1.0

Note: High inequality defined by Gini coefficients 1+ standard deviations above the mean of all county-year observations. Low inequality defined by Gini coefficients 1+ standard deviations below the mean of all county-year observations. Percentages are rounded to the nearest decimal. Row totals are affected by rounding error.

Table A2.

Population shares residing in high and low inequality counties, 1970 to 2016, by county type, alternative definition #1

	High					
	1970	1980	1990	2000	2010	2016
<u>Metropolitan total</u>	1.9	1.7	8.2	17.5	18.6	26.3
Large metropolitan, central	2.2	2.5	9.6	22.1	23.0	34.4
Large metropolitan, periphery	1.2	0.0	0.8	0.0	0.4	0.0
Medium and small metropolitan	1.4	0.6	6.9	12.7	15.0	18.3
<u>Non-metropolitan total</u>	12.4	7.0	16.3	16.8	14.5	19.2
Highly urbanized non-metropolitan	3.2	3.5	12.8	12.6	14.0	21.1
Moderately urbanized non-metropolitan	14.8	8.0	17.3	17.8	14.1	17.8
Least urbanized non-metro	23.7	11.0	20.5	22.8	18.0	20.2
	Low					
	1970	1980	1990	2000	2010	2016
<u>Metropolitan total</u>	57.8	30.1	14.8	8.7	6.0	2.5
Large metropolitan, central	62.2	29.8	15.7	7.3	4.8	1.3

Large metropolitan, periphery	71.0	71.7	52.0	44.6	35.3	19.4
Medium and small metropolitan	49.2	25.9	8.8	5.9	3.3	1.6
<u>Non-metropolitan total</u>	24.3	20.2	9.3	8.4	6.2	3.8
Highly urbanized non-metropolitan	41.6	27.0	8.9	4.9	2.7	2.5
Moderately urbanized non-metropolitan	19.0	18.9	9.9	10.5	7.0	4.0
Least urbanized non-metropolitan	7.6	9.4	7.7	7.3	11.7	6.5

Note: High inequality defined by Gini coefficients 1+ standard deviations above the mean of all county-year observations. Low inequality defined by Gini coefficients 1+ standard deviations below the mean of all county-year observations. Percentages are rounded to the nearest decimal. Row totals are affected by rounding error.

Table A3.

Percentage of counties characterized by high and low inequality, by county type, alternative definition #2

		0 times	1 to 2 times	3 to 4 times	5 to 6 times
High inequality	Metropolitan total	91.0	5.1	3.3	0.6
	Large metropolitan, central	85.6	6.59	5.99	1.8
	Large metropolitan, periphery	97.7	2.3	0.0	0.0
	Medium and small metropolitan	91.0	5.26	3.3	0.4
	Non-metropolitan total	67.0	21.9	7.9	3.3
	Highly urbanized non-metropolitan	81.7	10.0	6.22	2.1
	Moderately urbanized non-metropolitan	70.2	18.5	7.9	3.4
	Least urbanized non-metropolitan	57.1	31.0	8.3	3.5
Low inequality	Metropolitan total	51.1	31.3	12.2	5.4
	Large metropolitan, central	35.3	40.1	19.8	4.8
	Large metropolitan, periphery	35.6	25.0	23.5	15.9
	Medium and small metropolitan	60.2	30.0	6.8	2.9
	Non-metropolitan total	78.5	17.0	3.5	1.0
	Highly urbanized non-metropolitan	73.0	22.0	4.2	0.8
	Moderately urbanized non-metropolitan	79.3	15.7	3.6	1.4
	Least urbanized non-metropolitan	79.0	17.4	3.3	0.4

Note: High inequality is defined by Gini coefficients in the top decile of all county-year observations. Low inequality is defined by Gini coefficients in the bottom decile of all county-year observations. Percentages are rounded to the nearest decimal. Row totals are affected by rounding error.

Table A4.

Population shares residing in high and low inequality counties, 1970 to 2016, by county type, alternative definition #2

	High					
	1970	1980	1990	2000	2010	2016
<u>Metropolitan total</u>	1.7	1.5	6.2	14.1	8.3	19.9
Large metropolitan, central	2.2	2.5	8.3	19.1	11.1	28.5
Large metropolitan, periphery	1.2	0.0	0.8	0.0	0.0	0.0
Medium and small metropolitan	0.7	0.2	3.5	8.3	5.4	10.2

<u>Non-metropolitan total</u>	8.3	4.2	11.1	10.7	9.2	12.3
Highly urbanized non-metropolitan	2.8	0.8	7.5	8.3	8.8	11.2
Moderately urbanized non-metropolitan	9.3	5.3	12.0	10.7	9.1	12.5
Least urbanized non-metro	16.6	7.8	15.9	16.8	11.2	14.2
Low						
	1970	1980	1990	2000	2010	2016
<u>Metropolitan total</u>	44.1	21.4	11.9	6.1	3.5	1.3
Large metropolitan, central	45.8	20.3	12.9	5.6	2.2	1.0
Large metropolitan, periphery	66.0	62.5	41.9	32.2	25.4	10.4
Medium and small metropolitan	39.0	18.3	6.8	3.3	2.1	0.4
<u>Non-metropolitan total</u>	17.8	13.7	5.7	5.2	3.7	1.7
Highly urbanized non-metropolitan	29.2	20.0	4.3	3.5	1.9	0.8
Moderately urbanized non-metropolitan	14.6	12.5	6.6	6.1	3.8	1.8
Least urbanized non-metropolitan	5.3	4.0	5.3	4.8	7.8	3.5

Note: High inequality is defined by Gini coefficients in the top decile of all county-year observations. Low inequality is defined by Gini coefficients in the bottom decile of all county-year observations. Percentages are rounded to the nearest decimal. Row totals are affected by rounding error.

Table A5.

Linear regression model of county-level Gini coefficient, 1970

Model A1	
Independent variable	
Large metropolitan, central (ref)	
Large metropolitan, periphery	0.0087 *
Medium and small metropolitan	0.0199 ***
Highly urbanized non-metropolitan	0.0338 ***
Moderately urbanized non-metropolitan	0.0500 ***
Least urbanized non-metropolitan	0.0624 ***
Region	
Northeast (ref)	
Midwest	0.0139 ***
South	0.0421 ***
West	0.0080 **

$R^2 = 0.3579$

N = 3,076 counties.

* $p < .05$

** $p < .01$;

*** $p < .001$

Constant not shown

Table A6.

Linear regression model of county-level Gini coefficient, 2016

Model A2		
Independent variable		
Large metropolitan, central (ref)		
Large metropolitan, periphery	−0.0318	***
Medium and small metropolitan	−0.0071	**
Highly urbanized non-metropolitan	0.0030	
Moderately urbanized non-metropolitan	−0.0011	
Least urbanized non-metropolitan	0.0011	
Region		
Northeast (ref)		
Midwest	−0.0094	***
South	0.0198	***
West	0.0006	

 $R^2 = 0.1925$

N = 3,076 counties.

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

Constant not shown

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Figure 1.
Mean Gini coefficient from 1970 to 2016, by metropolitan status

Figure 2.
Mean Gini coefficient from 1970 to 2016, by county type

Figure 3.
Gini coefficient for U.S. counties, 1970 (left) and 2016 (right)

Figure 4.
Absolute change in county Gini coefficient, 1970 to 2016

Figure 5.
Persistently high inequality counties, 1970 to 2016

Figure 6.
Scatterplot of 2016 on 1970 Gini coefficient, by county type

Table 1.

Summary of county-level Gini coefficient, by county type

County type	1970	1980	1990	2000	2010	2016	Total Count
Metropolitan total	.3842 (.0363)	.3902 (.0297)	.4065 (.0349)	.4132 (.0334)	.4172 (.0307)	.4251 (.0292)	812
Large metropolitan, central	.3647 (.0391)	.3840 (.0349)	.4015 (.0381)	.4166 (.0368)	.4218 (.0327)	.4324 (.0319)	167
Large metropolitan, periphery	.3792 (.0353)	.3784 (.0283)	.3866 (.0367)	.3855 (.0274)	.3918 (.0258)	.4018 (.0231)	132
Medium and small metropolitan	.3918 (.0329)	.3952 (.0269)	.4133 (.0309)	.4192 (.0299)	.4222 (.0280)	.4286 (.0268)	513
Non-metropolitan total	.4232 (.0406)	.4163 (.0337)	.4283 (.0383)	.4305 (.0380)	.4273 (.0374)	.4334 (.0345)	2,264
Highly urbanized non-metropolitan	.4010 (.0328)	.4025 (.0270)	.4232 (.0325)	.4278 (.0308)	.4291 (.0292)	.4353 (.0292)	241
Moderately urbanized non-metropolitan	.4217 (.0376)	.4144 (.0331)	.4287 (.0380)	.4293 (.0368)	.4275 (.0358)	.4331 (.0331)	1,253
Least urbanized non-metropolitan	.4326 (.0415)	.4238 (.0348)	.4293 (.0404)	.4333 (.0418)	.4265 (.0422)	.4334 (.0381)	770
Total	.4129 (.0424)	.4094 (.0346)	.4226 (.0386)	.4259 (.0376)	.4246 (.0361)	.4312 (.0334)	3,076

Note: Standard deviations are shown in parentheses. The metropolitan status for the six strata and metropolitan/non-metropolitan totals were determined by the 1993 RUCC delineations.

Table 2.

Summary of absolute change in Gini coefficient, 1970 to 2016, by county type

County type	
Metropolitan total	.0409 (.0351)
Large metropolitan, central	.0676 (.0298)
Large metropolitan, periphery	.0227 (.0338)
Medium and small metropolitan	.0368 (.0322)
Non-metropolitan total	.0102 (.0388)
Highly urbanized non-metropolitan	.0343 (.0262)
Moderately urbanized non-metropolitan	.0114 (.0326)
Least urbanized non-metropolitan	.0008 (.0402)
Total	.0183 (.0402)

Note: Standard deviations are shown in parentheses. The metropolitan status for the six strata and metropolitan/non-metropolitan totals were determined by the 1993 RUCC delineations.

Table 3.

Percentage of counties characterized by high and low inequality, by county type

		0 times	1 to 2 times	3 to 4 times	5 to 6 times
High inequality	Metropolitan total	94.8	2.8	1.9	0.5
	Large metropolitan, central	90.4	4.8	3.0	1.8
	Large metropolitan, periphery	99.2	0.8	0.0	0.0
	Medium and small metropolitan	95.1	2.7	2.0	0.2
	Non-metropolitan total	74.8	18.4	5.0	1.9
	Highly urbanized non-metropolitan	88.9	6.6	3.7	0.8
	Moderately urbanized non-metropolitan	78.0	15.8	4.2	2.1
	Least urbanized non-metropolitan	65.2	26.2	6.8	1.9
		0 times	1 to 2 times	3 to 4 times	5 to 6 times
Low inequality	Metropolitan total	66.9	22.8	8.2	2.1
	Large metropolitan, central	49.1	34.7	13.8	2.4
	Large metropolitan, periphery	51.5	24.2	16.7	7.6
	Medium and small metropolitan	76.7	18.5	4.3	0.6
	Non-metropolitan total	88.8	9.7	1.4	0.2
	Highly urbanized non-metropolitan	86.9	12.4	1.7	0.0
	Moderately urbanized non-metropolitan	89.4	8.8	1.5	0.3
	Least urbanized non-metropolitan	88.7	10.3	1.0	0.0

Note: High inequality defined by Gini coefficients 1.5+ standard deviations above the mean of all county-year observations. Low inequality defined by Gini coefficients 1.5+ standard deviations below the mean of all county-year observations. Percentages are rounded to the nearest decimal. Row totals are affected by rounding error.

Table 4.

Matrix of transitions between inequality levels in 1970 and 2016, by county type

		Metropolitan total			Large metropolitan, central			Large metropolitan, periphery			Medium and small metropolitan		
		2016			2016			2016			2016		
<u>1970</u>	H	H	M	L	H	M	L	H	M	L	H	M	L
	H	66.7	33.3	0.0	100.0	0.0	0.0	100.0	0.0	0.0	50.0	50.0	0.0
	M	5.0	94.1	0.9	M	83.3	0.0	M	0.0	94.2	M	3.7	96.3
	L	0.0	97.4	2.6	L	0.0	100.0	L	0.0	91.3	L	0.0	98.1
Non-metropolitan total		Non-metropolitan total			Highly urbanized non-metropolitan			Moderately urbanized non-metropolitan			Least urbanized non-metropolitan		
		2016			2016			2016			2016		
<u>1970</u>	H	H	M	L	H	M	L	H	M	L	H	M	L
	H	34.2	65.3	.53	40.0	60.0	0.0	43.0	57.0	0.0	26.3	72.7	1.0
	M	8.5	90.6	0.9	M	93.3	0.0	M	8.17	91.4	M	9.7	88.5
	L	1.5	97.0	1.5	L	0.0	100.0	L	0.0	97.4	L	6.7	93.3

Note: H = High, M = Moderate, L = Low. Percent is rounded to the nearest decimal. Row totals are affected by rounding error.

Table 5.

Population shares residing in high and low inequality counties, 1970 to 2016, by county type

	High inequality					
	1970	1980	1990	2000	2010	2016
<u>Metropolitan total</u>	1.0	1.4	2.0	7.3	5.8	8.2
Large metropolitan, central	1.6	2.5	2.3	9.7	8.2	12.6
Large metropolitan, periphery	0.0	0.0	0.1	0.0	0.0	0.0
Medium and small metropolitan	0.2	0.0	1.7	4.5	3.1	3.0
<u>Non-metropolitan total</u>	5.7	2.8	7.6	7.1	5.6	7.6
Highly urbanized non-metropolitan	1.9	0.1	4.7	5.5	3.8	5.7
Moderately urbanized non-metropolitan	6.2	3.1	8.0	6.9	6.1	8.1
Least urbanized non-metro	12.2	5.9	12.9	12.3	7.8	9.8
	Low inequality					
	1970	1980	1990	2000	2010	2016
<u>Metropolitan total</u>	30.0	11.9	6.9	3.4	1.8	0.0
Large metropolitan, central	32.5	12.9	8.0	2.7	1.0	0.0
Large metropolitan, periphery	55.5	45.6	27.8	25.6	16.0	6.8
Medium and small metropolitan	23.7	6.4	2.7	1.4	0.1	0.0
<u>Non-metropolitan total</u>	8.3	4.8	2.0	2.3	1.7	0.0
Highly urbanized non-metropolitan	14.2	6.9	1.5	1.9	0.1	0.0
Moderately urbanized non-metropolitan	6.7	4.4	2.4	2.7	1.9	0.0
Least urbanized non-metropolitan	1.8	1.7	1.6	1.7	3.0	1.2

Note: Percentages are rounded to the nearest decimal. Row totals are affected by rounding error.