Income Inequality across the Rural-Urban Continuum

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Background and motivation

After decades of stable or declining levels of income inequality during the middle third of the twentieth century, income disparities 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, constituting a so-called Great U-Turn in income inequality (Bluestone & Harrison 1988; Morris & Western 1999; Nielsen & Alderson 1997; Saez 2017). The United States now has the fourth-highest level of income inequality among OECD countries, behind 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 and, importantly for our research, subsets of places (Chetty et al. 2014; Massey 1996; Saez 2017).

The overall contours of today's inequality crisis are well known at the national level (Morris & Western 1999; Piketty & Saez 2003; Saez 2017; Western et al. 2008). However, there has been less scholarly attention to understanding inequality at the sub-national level, within localities. Attention to disparities at the local scale is merited since it is in these spaces where most social and economic interactions take place. The limited attention to the sub-national scale has also restricted knowledge about whether and how the dynamics of income inequality may vary between rural and urban areas, and within the rural sector itself. Such differences are expected given major, but spatially heterogeneous economic and demographic changes over recent decades, including industrial restructuring, growing racial and ethnic diversity, and population aging (Bailey et al. 2014; Brown & Swanson 2004; Lichter 2012; Lichter & Brown 2011; Vias & Nelson 2006; Yang & Jensen 2015).

We also expect patterns of local income inequality to vary systematically between rural and urban areas. The United States is characterized by uneven spatial development, and rural areas have disproportionately lagged behind urban areas. While spatially uneven economic development across the United States is widely recognized (Lobao et al. 2007), there is only a limited and inconsistent body of evidence on how spatial patterns of income inequality vary across the urban-rural continuum. Neoclassical scholars contend that spatial inequality of income levels should converge as differences in the level of economic development between urban and rural areas decline (Williamson 1965) while economic geographers contend that places of initial advantage will retain their positions during late capitalism (Dunford & Smith 2000).

More generally, our analysis is motivated by our contention that, for a variety of reasons, demographers need to pay more attention to the rural United States. First, the rural population is sizable. Defined as those living outside of metropolitan areas, nonmetropolitan Americans comprise 15 percent of the population, and these 46 million people are spread across 72 percent of America's land area (Economic Research Service 2017). Second, many rural areas are subjected to unique and interesting demographic forces that are inherently worthy of study and that interact with inequality in compelling ways. Rural America is marked by longstanding patterns of net out-migration among youth and an aging-in-place population that has, in many non-metropolitan

counties, resulted in natural population decrease (Johnson 2013, 2018). At the same time, a subset of rural areas has experienced population increases due to the influx of new immigrants. These immigrants are bypassing traditional gateways to rural areas as they seek jobs in meatpacking, amenity-related construction, and other industries (Lichter 2013). Moreover, relatively well-off retirees are moving into a selective set of rural retirement destinations, having uncertain impacts on the levels of income inequality (Brown & Glasgow 2008). As such, rural America constitutes a microcosm where demographic dynamics are often easier to see and more consequential for localities. An implication is that the income distribution in such places may be particularly volatile and affected by such demographic changes.

Finally, as the 2016 Presidential election reminded the nation, rural areas hold disproportionate political power relative to their population size (Monnat & Brown 2017). Many rural places are both acutely susceptible to recent forces affecting increased income inequality and reliable supporters of political movements with platforms that are often antithetical to inequality-reduction. For these and other reasons, an exploration of income inequality across the rural-urban divided is particularly timely. With these motivations in mind, we empirically assess the association between location in the urban hierarchy and income inequality by describing recent pattern of income inequality within and between rural and urban communities, and observing how these differences compare with prior decades.

Objectives
The overall goal of this study is to understand recent income inequality dynamics within non-metropolitan U.S. counties. To this end, we address four objectives. *First,* we describe and map levels of within-county income inequality in 2016, comparing non-metropolitan and metropolitan counties. *Second,* we evaluate whether levels of within-county income inequality in 2016 vary among non-metropolitan counties, focusing on differences according to population size, urbanicity, and adjacency to metropolitan areas. *Third,* we describe and compare the demographic profile of high- and low-inequality non-metropolitan counties to determine whether and how the populations exposed to such places vary. *Fourth,* we analyze how levels and patterns of income inequality and the demographic profiles of high- and low-inequality non-metropolitan counties have changed in the nearly five decades since 1970.

Data, measures, and methods
We draw on county-level summary files from the 2016 American Community Survey (ACS) 5-year sample and the 1970 Decennial Census.[1] Our outcome of interest is within-county household income inequality, which we measure using the Gini coefficient. The Gini coefficient is a commonly-used measure of inequality (Allison 1978) that ranges from 0 (perfect equality) to 1 (perfect inequality). The coefficient corresponds to the ratio of the area between the Lorenz Curve—which plots the cumulative distribution of income against the corresponding cumulative share of the population—and the diagonal line of equity produced when income is distributed evenly across the population of interest, to the total area between the line of equity and the y- and x-axes.

Household income data in the ACS and census summary files are categorized into bins (e.g., $10,000-19,999, $20,000-29,999). To estimate the Gini coefficient using the binned income data we use the so-called midpoint method. Here, incomes within all but the top bin are assigned a bin's midpoint (for example, the value $25,000 is assigned to the category $20,000-29,999). The

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[1] We use the summary files because microdata with county identifiers are not publicly available.

top bin is assigned a "pseudo-midpoint" assuming the incomes within that bin follow a Pareto distribution (Nielsen & Alderson 1997; Reardon & Bischoff 2011; von Hippel et al. 2017). Note that we will test the sensitivity of our results by comparing these estimates with the "true" Gini coefficients produced by the Census Bureau based on restricted microdata for a limited number of years; and with estimates using alternative methods for dealing with binned income (von Hippel et al. 2017).

We describe levels of income inequality between metropolitan and non-metropolitan areas, and among different types of non-metropolitan countries. We use two sets of stratifying variables. First, we use the binary metropolitan *versus* non-metropolitan delineations produced by the Office of Management and Budget (OMB). Second, to examine systematic variation within non-metropolitan areas, we classify countries using the Rural-Urban Continuum Codes (RUCC) produced by the United State Department of Agriculture Economic Research Service (ERS). The RUCC system differentiates non-metropolitan counties by urbanization level and adjacency (non-adjacency) to metropolitan areas. Given our historical focus, the choice of metropolitan delineations is complicated by the re-classification of metropolitan and non-metropolitan counties over time (Fuguitt et al. 1988). Our preliminary analyses use the 'current' OMB and ERS delineations for each period we consider (i.e., 1974 for the 1970 data; 2013 for the 2016 data), but we will conduct sensitivity analyses using alternative approaches (e.g., the delineations at the mid-point of the 1970-2016 period.

Next, we will produce demographic profiles of high- and low-inequality non-metropolitan counties to understand whether and how the rural populations residing in such contexts differ. Here, we will define high- and low-inequality counties as the top and bottom 10 percent of non-metropolitan counties in terms of their Gini coefficients. There were 1,976 non-metropolitan counties in 2013 such that we would be examining roughly 198 counties in each of the high- and low-inequality categories. The demographic profiles will focus on characteristics including race and ethnicity, nativity, age structure, educational attainment, income, industrial-occupational structures, and employment status. Finally, we will replicate these analyses for 1970, and compare levels and patterns of inequality from 1970 to 2016.

Preliminary findings

We begin our preliminary analyses by summarizing within-county household income inequality in 1970 and 2016 (Table 1). Overall, we observe a modest uptick in local inequality, with the average Gini coefficient across U.S. counties increasing from 0.412 to 0.432 over this period. Local income inequality is, on average, higher in nonmetropolitan than metropolitan counties across both study periods. In 1970, for example, the average county Gini coefficient was 0.380 in metropolitan areas and 0.420 in non-metropolitan areas. However, we find evidence of convergence over time, as the metropolitan vs. non-metropolitan gap in the mean Gini coefficient decreased from 0.040 to 0.005 from 1970 to 2016.

(Table 1)

We next examine variation in local income inequality among non-metropolitan counties by drawing comparisons across RUCC categories (Table 2). The results from 1970 reveal a pattern characterized by modest increases in local income inequality along the continuum from more urbanized, metropolitan-adjacent non-metropolitan counties to the least urbanized and non-adjacent counties. This gradient is largely eliminated by 2016. The results for that year suggest little correlation between the degree of rurality, so defined, and local inequality.

(Table 2)

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Finally, we map levels of within-county income inequality and overlay this map with the county's metropolitan status (Figure 1). These maps clearly illustrate the overall increase in income inequality between 1970 to 2016. They also highlight important regional variation, with some places (e.g., the non-metropolitan South) characterized by persistently high levels of income inequality, others (e.g., parts of the central Great Plains and inter-mountain West) by persistent equality, and yet others (e.g., the northwest and northern Rockies) by rapid increases in inequality over the study period. These maps also highlight the heterogeneous economic conditions within both the non-metropolitan and metropolitan sectors.

(Figure 1)

Future research

To complete the proposed paper, we will build on these preliminary analyses in three primary ways. First, we will use these initial findings to identify high- and low-inequality counties (as defined above) and construct demographic profiles of the populations in these groups of counties. Second, we will test the sensitivity of our findings to the use of alternative metropolitan (non-metropolitan) delineations. Third, we will also test the sensitivity of our findings to alternative approaches for estimating income inequality using binned income data (von Hippel et al. 2017).

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Tables

Table 1. Household income inequality for metropolitan and nonmetropolitan U.S. counties: Difference between 1970 and 2016

Metropolitan status	Year	Mean	SD	Min	Max
Total					
	1970	0.4123	0.0426	0.2643	0.5835
	2016	0.4322	0.0346	0.3233	0.7118
Difference		0.0199			
Metro					
	1970	0.3803	0.0369	0.2692	0.4842
	2016	0.4289	0.0342	0.3458	0.7118
Difference		0.0486			
Nonmetro					
	1970	0.4206	0.0399	0.2643	0.5835
	2016	0.4342	0.0347	0.3233	0.6081
Difference		0.0136			

Source: American Community Survey (2012-2016 Five Year Estimates). *Household Income in the Past 12 Months (2012-2016).* U.S. Census Bureau (1970). *Household Type and Age of Head by Income, 1970*. Data retrieved from IPUMS NHGIS, University of Minnesota, www.nhgis.org.

Table 2. Household income inequality among non-metropolitan counties, by Rural Urban Continuum Code (RUCC): Difference between 1970 and 2016

	Year	Mean	SD	Min	Max
RUCC 4	*Urban population of 20,000 or more, adjacent to a metro area*				
	1970	0.3914	0.0322	0.3366	0.4853
	2016	0.4318	0.0294	0.3754	0.5226
Difference		0.0404			
RUCC 5	*Urban population of 20,000 or more, not adjacent to a metro area*				
	1970	0.4052	0.0342	0.3269	0.5188
	2016	0.4358	0.0350	0.3563	0.5233
Difference		0.0306			
RUCC 6	*Urban population of 2,500 to 19,999, adjacent to a metro area*				
	1970	0.4162	0.0373	0.2980	0.5371
	2016	0.4334	0.0326	0.3576	0.5742
Difference		0.0172			
RUCC 7	*Urban population of 2,500 to 19,999, not adjacent to a metro area*				
	1970	0.4229	0.0391	0.2643	0.5377
	2016	0.4349	0.0341	0.3434	0.5669
Difference		0.0119			
RUCC 8	*Completely rural or less than 2,500 urban population, adjacent to a metro area*				
	1970	0.4262	0.0357	0.3189	0.5504
	2016	0.4394	0.0395	0.3480	0.5768
Difference		0.0132			
RUCC 9	*Completely rural or less than 2,500 urban population, not adjacent to a metro area*				
	1970	0.4318	0.0424	0.2772	0.5835
	2016	0.4329	0.0376	0.3233	0.6081
Difference		0.0011			

Note: RUCC codes of 4 to 9 represent nonmetropolitan counties in the 1974 and 2013 RUCC classification system. RUCC codes for metropolitan counties varied in the 1974 and 2013 classification systems: The 1974 metropolitan classification consists of RUCC codes 0 to 3, and the 2013 metropolitan classification consists of RUCC codes 1 to 3.

Source: Household Income in the Past 12 Months, 2012-2016 ACS. Household Type and Age of Head by Income, 1970 census. Data retrieved from IPUMS NHGIS, University of Minnesota, www.nhgis.org.
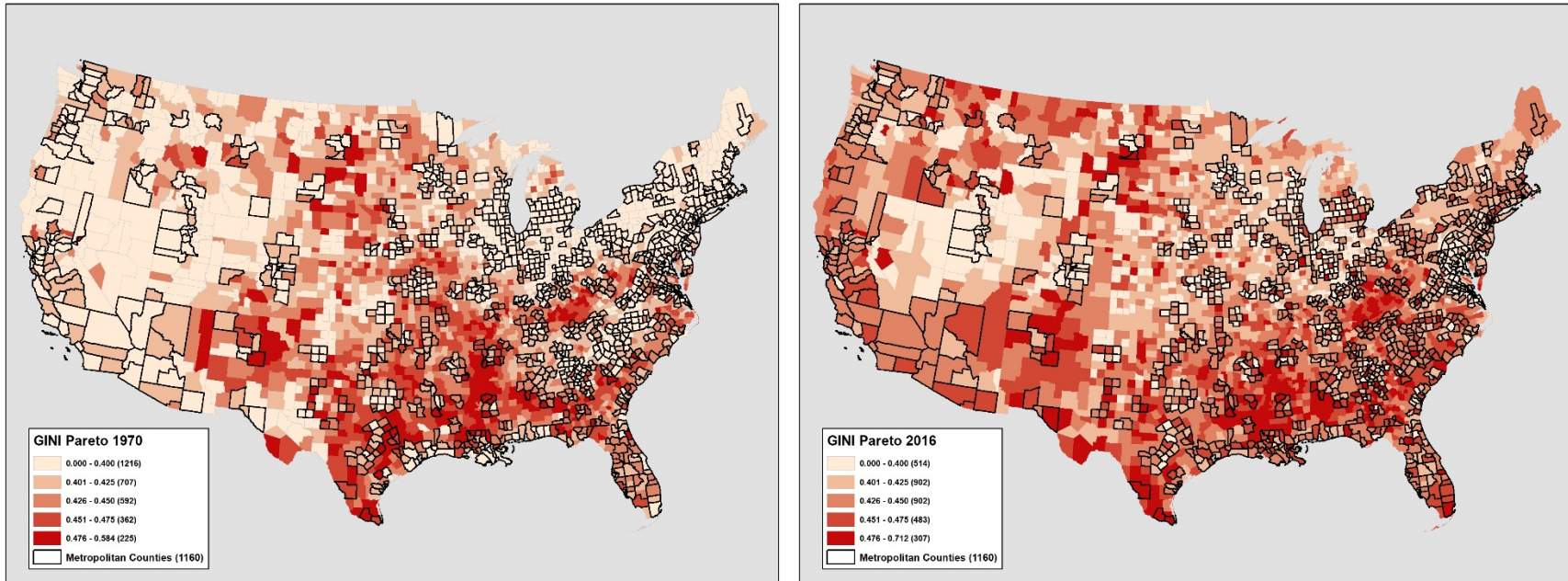
Figures

Figure 1. Household income inequality for U.S. counties by metropolitan status, 1970 (left panel) and 2016 (right panel)