THE SPATIAL VARIATION OF GEOGRAPHIC POLARIZATION IN THE UNITED STATES

by

Kyler Hudson

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1. Introduction

In 1977, sociologists Knoke and Henry predicted that “future trends suggest a diminishing political difference between rural and urban populations” (51). Given recent events, their prognostication could not be further from the truth. The so-called “rural-urban divide” has received increased attention in American politics in recent years. Politicians, pundits, and political scientists often remark on the stark differences in political opinion and behavior of rural and urban citizens. These differences can be seen in any recent electoral map; small clusters of dark blue Democratic strongholds are surrounded by vast swaths of bright red Republican territory. Recent work in political geography has documented the extent to which rural and urban Americans differ in their political views and behavior, often examining the question at the national level. But it is possible that this political polarization differs across the country. For example, rural and urban Texans may be politically similar while rural and urban Wisconsinites are politically distinct. Uncovering this spatial heterogeneity is important because national-level measures of geographic polarization may understate or overstate the degree of polarization in particular areas. For example, if rural and urban Texans are politically similar, examining geographic polarization at the national level will overstate the degree to which Texans are polarized.

Because of this gap in the literature, this project aims to answer the question: how does geographic political polarization vary across the country? The project provides greater understanding of the actual polarization on the ground by recognizing and measuring the spatial heterogeneity inherent in American politics. Both elites and ordinary citizens are concerned about polarization, but discuss it as if it is spatially uniform, equally strong
throughout the country. In order to address political polarization, we ought to know where it is relatively high and where it is low. My project uses precinct-level presidential election results and voter registration data to estimate the degree of political polarization in each state. In so doing, I can identify spatial patterns of geographic polarization, determining which states are relatively highly polarized and which are relatively non-polarized.

While this is a descriptive project and I do not have any strong predictions about the results, there are a few plausible outcomes. For example, states occupying a wider range along the rural-urban continuum may be more geographically polarized, as the state parties are better able to monopolize rural or urban places. In states that are more geographically homogenous, political cleavages cannot rest along geographic lines. In addition, southern states may be less geographically polarized, as they still contain a substantial population of rural blacks, who (unlike their white counterparts) overwhelmingly support Democrats. Finally, states with the largest media markets, such as New York and California, may be more geographically polarized than other states. For example, the media industry may attract political liberals to these states’ large cities, increasing geographic polarization within the state via residential sorting. If these states are highly polarized, it would explain political commentators’ fixation with geographic polarization and highlight the importance of describing the country’s spatial heterogeneity. Rather than affect everyone everywhere, geographic polarization may only (or especially) affect those with the loudest voices and most prominent platforms.
2. Literature Review

The academic literature concerning geographic political polarization can be classified in two ways. The first is along the descriptive-causal dimension. Earlier studies of polarization attempted to describe polarization as it exists, simply documenting the degree to which geography and political behavior are related. Some of this literature examined the increase of geographic polarization over time. Building upon this descriptive research, other authors attempted to identify causal mechanisms of polarization, proposing a litany of explanations. The other dimension upon which the geographic polarization literature can be divided is the level of analysis. Most of the work on polarization has examined the topic at the national level, studying how different the average rural American is from the average urban American. A smaller sub-literature examines geographic polarization at the subnational level; however, these studies only examine single states or cities. My project fills this gap by describing the degree of geographic polarization in each state, which will allow comparisons across states. The subsequent literature review evaluates the extant research on geographic polarization along these two dimensions. First, I will review descriptive studies that examine polarization at the national level. Second, I will review the few descriptive studies on sub-national geographic polarization. The third and final section reviews the causal theories of geographic polarization. Throughout the literature review I highlight the contribution of my project; studying subnational variation will reveal finer-grained detail while allowing for comparisons among states and theory building.
2.1 Geographic Polarization at the National Level

Research describing geographic political polarization at the national level can be divided into two broad categories: cross-sectional polarization and changes in polarization over time. The cross-sectional studies document how the politics of rural and urban Americans differ at one particular period of time. While the concept of geographic polarization is not limited to elections and voting, much of the research relies on election data or vote choice. Because of the recent interest in geographic polarization, many of these studies examine recent elections. For example, Scala and Johnson (2017) find that Americans in rural counties were much less likely to vote for Hillary Clinton in 2016 or Barack Obama in 2012 than Americans in urban counties. Likewise, Rohla et al. (2018) use electoral data from the 2008, 2012, and 2016 elections at various spatial scales to show that geographic polarization is highest at finer spatial scales. As mentioned in the introduction, an early example of geographic polarization research can be found in Knoke and Henry (1977). They observe that, relative to urban Americans, rural Americans are more politically conservative with regards to both voting behavior and issue stances, but predict that these differences will fade over time due to mass media and regional migration (Knoke and Henry, 1977). Most current political scientists would argue that this claim has not materialized, though some do argue that geographic polarization is overblown and Americans share substantial common ground on a range of issues and values (Strickler 2015).

Substantial academic work has moved beyond cross-sectional studies to discover how geographic polarization has changed over time. The majority of extant research suggests that polarization has increased in recent decades. For example, Lang and Pearson-Merkowitz
(2015) use presidential election data from 1972 to 2012 to measure the degree of geographic polarization. Because of the ideological sorting of the parties, the authors argue that geographic polarization increased dramatically in the mid-1990s. McKee (2008) attributes the growing gap between rural and urban voters to the migration of rural Southerners into the Republican Party; as rural Southerners increasingly voted for Republicans — just as rural northerners do — the general split between rural Americans and urban Americans grew. Johnston et al. (2020) use the concept of “landslide counties” — those in which one candidate wins by more than twenty percentage points — to illustrate how polarization has increased in the last two decades. Between 1992 and 2016, more counties delivered landslide victories and these landsides tended to benefit Republicans. While these studies reflect the dominant view, other scholars have pushed back against the simple claim that geographic polarization has grown dramatically across the country. For example, Monnat and Brown (2017) argue against the conventional wisdom that Donald Trump performed particularly well in rural America in 2016. They claim that Republican presidential candidates have won the support of rural America for decades. The important change that contributed to Trump’s win was his greater support in the rural Midwest specifically. McGhee and Krimm (2009) argue that claims of increasing polarization are overstated entirely. Rather than electoral results, they employ county-level voter registration records from 21 states, arguing that registration does not force citizens to support one of the two major parties. Rather than increased geographic polarization, the authors find increased independence between 1968 and 2008.
On balance, this body of research suggests that Americans are currently polarized along geographic lines, especially with regards to how they vote and to a greater degree than in decades past. While this national-level research is important, it may obscure lower level heterogeneity in geographic polarization. If Wisconsin is indeed starkly polarized, while Texas is not, many of these approaches would implicitly underestimate the degree of polarization in Wisconsin and overestimate it in Texas. This is a problem, not only because it leads to a misunderstanding of the political reality, but also because it may hinder efforts to address polarization. If geographic polarization is a normative problem that ought to be ameliorated, it is vital that we know where it exists. Failure to recognize spatial heterogeneity may result in wasted resources and ineffective interventions. In order to prevent this failure, it is necessary to investigate geographic polarization at the sub-national level.

2.2 Geographic Polarization at the Sub-National Level

There is a comparatively small, but nonetheless important, sub-literature that examines geographic polarization at the sub-national level, often looking at individual states or cities. For example, Oberhauser et al. (2019) use county-level results in Iowa from the 2016 presidential election to determine what factors best explain support for Donald Trump. They find that the “rurality” of a county is significantly related to its support for the Republican candidate. Koo et al. (2016) conduct similar analyses on California state elections between 1990 and 2014. They find that Californians are becoming more geographically polarized, as Republican counties become redder, Democratic counties become bluer, and the number of swing counties decreases. Myers examines the voting patterns in the state of
Texas between 1996 and 2010, finding “a continuous divergence in the geographical bases of its political parties” (2013, 48).

Kinsella et al. (2019) explore an even finer spatial scale. They examine the metropolitan area of Cincinnati, Ohio, specifically the support for a 2004 ballot referendum banning same-sex marriage. The authors find strong spatial clustering of support for the referendum, suggesting geographic polarization. Kinsella et al. (2021) again take a micro-scalar view of polarization, this time analyzing the ten most competitive counties in the 2016 presidential election. They illustrate how these “purple” counties are themselves geographically divided, with substantial spatial clustering of votes within each county. This article highlights the potential problems of aggregating electoral results. Because my project relies on precinct-level data, I am able to adequately address the Modifiable Areal Unit Problem. These analyses on specific states and localities may reflect a broader trend of geographic polarization across the entire country. Perhaps rural and urban residents are similarly polarized in Vermont, Georgia, and Nevada. However, these single area analyses cannot test this hypothesis. My proposed project *will* illustrate the level of geographic polarization within each state, allowing me to determine whether or not polarization is a broader trend or specific to only a particular set of states.

### 2.3 Causal Theories of Geographic Polarization

Because the conventional wisdom contends that the American public is increasingly geographically polarized, political scientists and political geographers have developed a variety of explanatory theories. These causal theories of why rural and urban people have
different political preferences can be divided into at least three distinct categories: residential sorting, cultural differences, and structural factors. While my proposed project is inherently descriptive, not causal, it may have implications for these theories. A future project could find the relationship between my state-level estimates of polarization and state-level data of these predictors to assess which set of theories is best supported by the empirical evidence. The project may also lead to the development of new theories of geographic polarization, by illustrating which states are the most and least polarized.

*Residential Sorting*

The most dominant causal theory of geographic polarization in the United States is residential sorting. The work most responsible for the residential sorting hypothesis is Bishop’s *The Big Sort* (2009), which claimed that geographic polarization was due to conscious self-selection into politically homogenous areas. Democrats move to cities to be near other Democrats, while Republicans move to rural areas to be closer to other Republicans. Over time, this pattern leads to greater spatial clustering. Gimpel and Hui (2015) use survey experiments to show that partisans evaluate neighborhoods more positively when they learn that their co-partisans live there. In addition, they find that respondents are able to infer the partisan composition of a neighborhood, based on non-political information such as its racial characteristics. This comports with the residential sorting hypothesis. People are able to identify where their co-partisans live and desire to live amongst them. Similar experiments by Gimpel and Hui (2018) reinforce these findings, suggesting that Americans estimate the partisan leaning of a neighborhood which then impacts their satisfaction with the neighborhood.
More direct testing of the residential sorting hypothesis has produced mixed results. Carlson and Gimpel (2019) use voter registration records in New England to determine the degree to which people are prone to move to areas that align with their political preferences. They find that some voters are likely to move towards areas with a higher share of co-partisans, but most voters actually relocate to politically mixed areas that have higher rates of employment and higher home values. However, these movers’ out-migration can leave their origin more politically homogenous, as their partisan neighbors stay behind. Mummolo and Nall (2017) agree that partisan clustering exists, but they argue against the residential sorting hypothesis by comparing participants’ stated preferences to their actual relocation decisions. While respondents claim they would prefer to live near co-partisans, they do not actually move to politically homogenous places. The authors claim that this is due to all residents, regardless of political persuasion, prioritizing non-political neighborhood factors, such as crime rate, school quality, and commute time. A similar study by Gimpel and Hui (2017) compares two versions of the residential sorting hypothesis: inadvertent sorting, in which non-political preferences happen to align with partisanship, and intentional sorting, in which partisanship is a direct factor in determining where to live. They argue that some combination of these two mechanisms is likely the cause of current geographic polarization, but geographic polarization would be even more dramatic if practical considerations, as discussed by Mummolo and Nall (2017), were not a factor.

Cultural Differences

The second, broader theory of geographic political polarization concerns cultural differences between rural and urban people. These theories are built on the idea that, in some
way, one’s geography structures one’s political outlook. For example, an early work by Gimpel and Karnes (2006) attributes the rural-urban divide to the economic-political culture of rural America. The authors claim that rural Americans’ greater self-employment and home ownership is directly connected to conservatism’s economic individualism. In this way, rural America and the Republican Party are a natural fit. Cramer (2016) takes an ethnographic approach to geographic polarization, from the rural side of the divide. She conducts interviews with rural Wisconsinites and attributes their political attitudes to a place-based social identity that she refers to as “rural consciousness.” This cultural identity motivates their opinions on the proper role of government and the allocation of resources. Walks (2006) uses survey data to investigate the possible causes of geographic political polarization between downtown Toronto and its suburbs. He finds that demographic-based spatial segregation is an important factor, as well as neighborhood self-selection. Supporters of left-wing parties gravitate towards the sense of community in the inner city, while supporters of right-wing parties are attracted to the privacy of suburban life. This theory blends the idea of cultural differences with residential sorting, claiming that one’s personal politics motivates them to seek out areas with a complementary culture.

Gimpel et al. (2020) provide two hypotheses of why rural and urban residents possess opposing political beliefs. First, the lack of interaction between rural and urban people leads to a divergence of political ideas, just as natural isolation can lead to species divergence in the wild. Second, population density itself can affect the formation of opinion. In large cities, relationships are more superficial and personal privacy is possible, which allows for the growth of heterodox ideas. In contrast, rural areas are characterized by tight-knit, long-lasting
relationships which promote the perseverance of political ideas over time. Remarkably, this argument is completely contrary to Walks’ (2006) argument that people move to the city to find community and leave it to find privacy. This theoretical disagreement may cast doubt on the idea that cultural differences motivate geographic polarization. A similar study by DellaPosta et al. (2015) also demonstrates how political homophily and personal interaction can create separate political cultures. Using simulation experiments, they show how these mechanisms can lead to a self-reinforcing cycle, in which, for example, a liberal’s preference for lattes can become a tell-tale marker of left-wing politics. This model could also apply to geographic polarization, in which local communities reinforce political preferences, thus leading to spatial clustering.

**Structural Factors**

The final category of causal theories focuses on structural factors. This area of research is comparatively smaller and newer. Within this sub-literature, authors argue that large-scale, seemingly unrelated changes can lead to geographic polarization. For example, Nall (2018) argues that the construction of the interstate highway system contributed to geographic political polarization. Highways allowed wealthier Republicans to relocate from city centers to surrounding suburbs, while Democrats stayed behind. This produced the familiar pattern of polarization that continues today. Similarly, Sorens (2018) documents how government policies that restrict the housing supply affect political geography. Areas implementing greater restrictions become more Democratic over time, perhaps by selecting for those with higher education (which is correlated with Democratic partisanship). Finally, Anastasopoulos (2019) theorizes that exogenous immigration can have an effect on
geographic political polarization. He examines the effect of African American migration into Houston, Texas following Hurricane Katrina on Republican vote share. When African Americans moved into Houston neighborhoods, white Republicans fled to the surrounding suburbs. In this way, seemingly unrelated shocks, like an influx of evacuees, can cause politics to break along geographic lines.

3. Analysis

In order to describe the spatial variation of geographic polarization, I estimate the level of geographic polarization in each state. In order to increase the reliability of my estimates, I approach the problem with two different kinds of data: voter registration data and electoral data. These two data types are commonly used in the political geography literature and provide sufficient coverage and scale to precisely estimate polarization in nearly every state. For each data type, I estimate geographic polarization two ways. One method is agnostic to rurality and simply measures the partisan clustering within the state. The second method directly includes a measure of rurality, determining how rurality is correlated with partisanship. With two data types and two methods, I have four analyses total, as shown in Table 1. This multi-pronged approach increases my confidence that I am accurately identifying real-world geographic polarization.

3.1 Data Sources

For this project, I primarily use two types of data: election data and voter registration data. The first dataset contains precinct-level electoral results for the 2016 presidential election. This dataset was created by the MIT Election Data and Science Lab and is hosted
on the Harvard Dataverse (link). It provides the number of votes received by each presidential candidate in each precinct in each state, as well as the precinct polygons. As of January 2022, data for West Virginia does not exist, so it is excluded from my analysis.

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<th>Registration Data</th>
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*Table 1. Statistical Analyses*

The second dataset comes from L2, a data analytics company that provides voter data to campaigns and political organizations. Because some states do not provide voters’ party registration, L2 estimates registration based on “voting results, our extensive commercial data, and academic modeling” (L2, 2022). I accessed L2’s state-level data via the Redistricting Data Hub (link). These datasets provide the estimated number of Democrats and Republicans within each census block in each state. I first aggregate the blocks into census tracts and then merge this dataset with shapefiles of the census tracts to compute the spatial statistics. With these two datasets, I can estimate geographic polarization in each state, as defined by spatial clustering.
In order to estimate geographic polarization using a measure of rurality, I incorporate population density data from the US Census Bureau. I collect the number of residents of each census tract via the `tidycensus` R package (link). I then merge this data with the census tract shapefiles to find the population density of each tract. I also use this data to impute the population density of precincts. For analyses 3 and 4, population density is the operationalization of rurality. With this variable, I can include rurality directly, rather than measuring only spatial clustering.

3.2. Analysis #1: Election Data, Rurality Excluded

For my first analysis of the spatial variation of geographic polarization, I examine the degree of partisan clustering in each state using electoral data. Unlike the conventional perception of geographic polarization as a “rural-urban divide,” this approach does not recognize the “rurality” of different areas of a state. It simply measures the degree to which partisan behavior clusters together.

Using the precinct-level voting data, I first find the Democratic share of the two-party vote for each precinct in the 2016 presidential election.¹ Each precinct polygon is assigned an attribute value, ranging from zero to one, with higher values representing greater Democratic support. Figure 1 illustrates the precinct two-party vote share in Wisconsin; as expected, the precincts near Madison and Milwaukee are much more Democratic than elsewhere in the state.

¹ The Democratic two-party vote share is computed by dividing the number of votes for the Democratic candidate by the sum of the votes for the Democratic and Republican candidates. This measure is frequently used in political science and political geography to compare district results across the country.
I then calculate the global Moran’s I statistic for each state. Moran’s I, which ranges from negative one to one, measures the degree of spatial autocorrelation in a geographic area. Highly clustered attribute values produce higher Moran’s I values. For example, if a state’s most Democratic precincts are clustered together, it will receive a high Moran’s I value, which will then be interpreted as a high degree of geographic polarization. If Democratic support is scattered throughout the state, the Moran’s I value will be low and interpreted as a low degree of geographic polarization.

Figure 2 shows a map of the Moran’s I values for each of the 49 states in the dataset. This method suggests that states in the Midwest are consistently more polarized than elsewhere in the country. Pennsylvania, Illinois, and Michigan all possess Moran’s I values greater than 0.90, indicating a very high degree of spatial autocorrelation. In contrast, Southern states like Arkansas, Mississippi, and South Carolina are not highly geographically polarized. In these states, the precincts that overwhelmingly support Democrats are not
clustered together in a few locations, but instead spread across the state.\textsuperscript{2} Again, this method does not incorporate a measure of rurality, but instead simply measures the clustering of votes within a state. It is possible that states with low Moran’s I values are actually polarized along rural-urban lines, but contain many dispersed urban areas, such that the spatial autocorrelation of Democratic vote share is relatively low. This explanation is plausible in Southern states like Mississippi that have many relatively small cities and towns.

![Figure 2. Moran’s I Values of Election Data](image)

### 3.3. Analysis #2: Registration Data, Rurality Excluded

The second statistical analysis also relies on spatial autocorrelation, but with voter registration data. Again, I find the degree to which partisan activity is clustered together, as a measure of geographic polarization. Like the previous analysis, I begin by finding the

\textsuperscript{2} For a visual comparison of the Democratic two-party vote share in a highly polarized state (Pennsylvania) and a non-polarized state (Mississippi), see Figure A1 in the appendix.
Democratic share within each geographic unit. Within each census tract, I divide the number of registered Democrats by the number of registered Democrats and registered Republicans, to find the Democratic two-party registration share. I then find the spatial autocorrelation of this measure, via global Moran’s I, for each state. These results are displayed in Figure 3.

Figure 3. Moran’s I Values of Registration Data

Again, these results suggest that the Midwestern states are highly geographically polarized. From Pennsylvania to Nebraska, the share of registered Democrats is highly clustered. For example, Figure 4 shows the spatial distribution of the share of registered Democrats in Illinois. The overwhelmingly Democratic census tracts are clustered near Chicago and the St. Louis suburbs, whereas the rest of the state is much more evenly split between registered Democrats and Republicans.
Figure 4. Democratic Two-Party Registration Share in Illinois

Figure 3 also shows that the South is relatively non-polarized, with Louisiana, Mississippi, and South Carolina displaying low Moran’s I values. As discussed previously, this may be due to rural blacks, who tend to register as Democrats and are more evenly spread across states in the South (relative to their counterparts in the North). Several northern states, near the Canadian border are also non-polarized, including the Dakotas, Montana, Vermont, and New Hampshire. This may be due to a uniform share of Democrats within these states, at either competitive or non-competitive levels. If, for example, most census tracts in North Dakota are predominantly Republican, the Moran’s I value would be low because the registration values are not clustered (they are uniformly pro-Republican). On the other hand, the registration share could be uniformly competitive, also resulting in a low Moran’s I value. For example, Vermont’s census tracts could all contain between 40% and 60% Democrats, meaning that the share of registered Democrats is not clustered. In both
cases, the spatial correlation would be low, which is interpreted as a low degree of geographic polarization.  

3.4. Analysis #3: Election Data, Rurality Included

The third statistical analysis uses regression to determine how rurality is related to electoral results. Unlike the previous methods, I categorize the observations along a rural-urban continuum. Population density is used as a proxy for rurality. Because electoral precincts are used exclusively for voting, I need to impute their population density. Figure 5 provides an illustration of the imputation process with a rudimentary example.

As shown in panel A, I begin by selecting a precinct (shown in blue) and find all of the tracts that it intersects (shown in red). I know the population and area of each tract and the area of the precinct. Panels B and C illustrate how to estimate the population of the different parts of the precinct. For each overlapping tract, I find the fraction of the tract shared by the precinct and then multiply this fraction by the tract’s population. This acts as an estimate of the population for that area of the precinct. I then sum the estimates for all sections of the precinct, producing an estimate of the population of each precinct, as shown in panel D. This process assumes that a tract’s population is evenly spatially distributed, which is reasonable given the small size of census tracts. According to the Census Bureau, the average census tract contains roughly 4,000 residents.

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3 Figure A2 shows how a non-competitive distribution of partisan registration (North Dakota) and a competitive distribution (Vermont) can both lead to low spatial autocorrelation values.

4 According to the Census Bureau, the average census tract contains roughly 4,000 residents.
After imputing the population density of each precinct, I use linear regression to find the relationship between density and Democratic vote share within each state. If rurality was completely unrelated to politics, we would expect the correlation coefficient to be zero. If higher population density is associated with greater support for Democrats, we would expect the coefficient to be positive. Figure 6 displays the resulting regression coefficients. This map suggests that states in the south are far more geographically polarized than states elsewhere in the country. The relationship between population density and Democratic vote share within each state is shown in Figure 6.

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5 Due to errors in the raw precinct data shapefiles, I cannot impute the population density of precincts in Florida or Oregon and therefore cannot compute their regression coefficients.
support is stronger in Alabama, Mississippi, and Tennessee than in any other state. States in the West, such as California and Nevada, and states in the Northeast, such as New York and Massachusetts, are relatively non-polarized.

![Figure 6. Regression Coefficients of Population Density on Democratic Vote Share](image)

**3.5. Analysis #4: Registration Data, Rurality Included**

The fourth and final analysis again finds the relationship between rurality and partisanship, but using the registration data. Because the Census Bureau provides the area and population of each census tract, I do not need to impute any additional data. I simply compute each tract’s population density by dividing the population by the area and then merge this dataset with the registration dataset. I then run a regression of population density
on Democratic two-party registration share for each state, saving the coefficients. These coefficients are displayed in Figure 7.

*Figure 7. Regression Coefficients of Population Density on Democratic Registration Share*

Figure 7 shows that states in the South tend to be more highly polarized. The relationship between population density and the percentage of registered Democrats is stronger in these states. In contrast, states in the Northeast and Mountain West are relatively non-polarized, meaning that the relationship between density and Democratic registration is weaker.
4. Results

The results from my four analyses paint a picture of the spatial variation of geographic polarization. Examining how these results agree and disagree with one another can provide insight into the nature of geographic polarization and highlight the importance of measurement choices. This section will compare the results of the four analyses both informally and statistically and discuss the implications of these comparisons.

The results from Analyses #1 and #2 (shown in Figures 2 and 3) are in general agreement. Unsurprisingly, the spatial autocorrelation of Democratic vote share in a state is similar to the spatial autocorrelation of Democratic registration share in that state. Figure 8 shows a scatterplot matrix of the polarization values across the four analyses; each scatterplot shows the relationship between two of the scores, one on each axis. For example, the plot in the lower-left corner shows the relationship between the polarization values from Analyses #1 and #4. Because plotting the polarization scores from one analysis on both axes would show a perfectly linear relationship, the plots on the diagonal show a histogram of the values for that analysis. For example, the subplot in the upper-left corner is a histogram of the polarization values from Analysis #1.

The second subplot in the first column of Figure 8 clearly shows a stronger relationship than the other two scatterplots in the column, suggesting that the results from Analysis #1 are most similar to those from Analysis #2. These first two analyses suggest that, in general, states in the South are non-polarized and states in the Midwest are highly polarized. For example, Illinois has the highest Moran’s I value of any state for both vote
share and registration share. The biggest difference between the first two analyses is that Analysis #1 finds that Maine, Nevada, and California are relatively non-polarized while Analysis #2 finds that these three states are quite polarized. However, barring these three anomalies, the substantial overlap across the other 46 states ought to increase our confidence in the results.

Like the first two analyses, results from Analyses #3 and #4 are largely similar. In Figure 8, the third plot in the fourth row shows a strong correlation between the polarization values from the third and fourth analyses. These results are much more strongly correlated with one another than with those from either of the first two analyses. Both find that Southern states are the most polarized, while basically everywhere else is non-polarized, particularly states in the Northeast and Southwest. For example, Alabama is the most
polarized state from Analysis #4 and the second-most polarized from Analysis #3. Like before, this agreement ought to increase our confidence in the results.

However, the two pairs of analyses seem to dramatically disagree. How can Illinois be the most polarized state in Analyses #1 and #2, while simultaneously being one of the least polarized according to Analyses #3 and #4? This outcome suggests that the operationalization of geographic polarization is more important than the data type. Using election data or registration data did not dramatically change the results; however, measuring polarization as spatial autocorrelation rather than the correlation between population density and Democratic concentration does affect the results. This discrepancy does not mean that one set of results is correct and the other is incorrect. While both measurement methods seem to capture the concept of “geographic polarization,” they are indeed distinct based on the inclusion of rurality. For example, imagine a state where rural and urban voters are equally likely to vote for the Democratic candidate. However, the state is sectionally split between the North and South, such that voters in the North are highly likely to vote for Democrats, while those in the South are staunchly Republican. Analyses #3 and #4 would find that this state is non-polarized (because there is no relationship between density and vote choice), while Analyses #1 and #2 would find that this state is highly polarized (because of the high spatial autocorrelation of vote choice).

The “correctness” of the results is dependent on the researcher’s conception of geographic polarization. In the popular press, geographic polarization is often described in terms of a rural-urban divide, though theoretically this may not always be the case. For example, during the Civil War, Virginia was geographically divided based on loyalty to the
Union. The northwestern part of the state wanted to remain in the Union while the rest wanted to secede, resulting in the creation of West Virginia. The state was geographically polarized, but the polarization was not primarily along a rural-urban cleavage. A similar dynamic may currently be taking place in Midwestern states, which display high polarization according to spatial autocorrelation but low polarization according to correlation with population density. The discrepancy of results between measurement methods suggests that political scientists and geographers ought to take care when describing American geographic political polarization. A state may look highly polarized when polarization is measured one way and non-polarized when measured a different way. Ideally, future researchers are clear about their conception of geographic polarization and recognize the potential sensitivity of their results.

5. Conclusion

My project has described the variation of geographic political polarization across the United States. Using two large data sets and two measurement techniques, I have estimated the degree of geographic polarization within each state. My project builds on pre-existing work by recognizing that polarization, like many political phenomena, is not spatially homogenous. I find that my datasets produce similar results, though my two measurement techniques produce very different results. This suggests that the measurements capture two different aspects of the concept of geographic polarization. Future research on polarization should distinguish between these two meanings of geographic polarization and clarify why one measurement is preferable for a particular use case.
This project can act as a springboard for future research, both methodologically and substantively. For example, the third and fourth analyses could be redone with a different measure of rurality. Rather than using the population density of each census tract, I could instead create a rurality measure based on human mobility flows or proximity to metropolitan areas, as is used in some other contexts (USDA 2020). This new measure’s relationship with political outcomes (such as Democratic vote or registration share) may be systematically different from that of population density. For example, a rurality measure that accounts for proximity to a metropolitan area would view a suburb as more urban than a remote town, even if the population density of the suburb and town were comparable. This would have downstream effects on the state polarization values. As discussed previously, states in the South may have many dispersed towns and mid-sized cities. Measuring rurality in terms of proximity to metropolitan areas, rather than population density, would decrease the relative rurality of these areas; therefore, holding all else equal, the relationship between rurality and Democratic support would weaken.

In addition to changing the measure of rurality, future research could also change the spatial scale of the analyses. In this project, I elect to examine the geographic polarization of individual states, but it would be straightforward to repeat the analyses on other geographic units, such as counties, cities, or congressional districts. These results could be especially useful when examining geographic polarization as a dependent variable; for example, congressional districts that are more geographically polarized may elect more ideologically extreme representatives.
Similarly, I use global measures of spatial autocorrelation in Analyses #1 and #2, but it is possible to instead use local measures, such as local Moran’s I. This would describe the similarity of every geographic area (precinct or census tract) relative to its neighbors, rather than providing a single value for the entire geographic space. One disadvantage of this approach would be interpretability. For example, my use of global Moran’s I provides a straightforward interpretation of geographic polarization, i.e. “Wisconsin is more geographically polarized than Mississippi.” In contrast, an analysis using local Moran’s I might suggest that “this small, arbitrary geographic unit is more similar to its neighbors than other units are to their neighbors.” In addition, it is unclear how well this measure would represent the concept of geographic polarization. A global measure of spatial autocorrelation calculates the dispersion of a variable within a single, politically meaningful geographic unit, whereas local measures calculate the similarity of external units to a selected unit. The former measure’s internal perspective more closely matches the traditional conception of geographic polarization as political differences within a single polity.

Though my analyses are purely descriptive, the results could be used for theory-building about the causes behind polarization. For example, a time series analysis could examine how the results change over time and determine if they are correlated with some exogenous variable, such as a rise in heated rhetoric from political officials. These results could also be used to reverse the causal arrow and find the effects of increased polarization. When a state becomes more geographically polarized, does it experience greater legislative gridlock? Is there greater political participation or less? Do citizens have more or less faith in government? These questions are vital not only to flesh out political science theories, but also
to pursue and maintain a just democracy. Answers to these questions are only attainable with variation in geographic polarization; if every place is polarized the same amount, it is impossible to identify polarization’s effect on some dependent variable. This project demonstrates how to measure the spatial variation of geographic polarization, which can be utilized in future research.
Appendix

Figure A1. Democratic Two-Party Vote Share in Mississippi and Pennsylvania
Figure A2. Democratic Two-Party Registration Share in North Dakota and Vermont
Bibliography


