ARTICLE

SPATIAL DIVERSITY

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SPATIAL DIVERSITY

Nicholas O. Stephanopoulos[*]

Why do Supreme Court opinions denounce some districts as political gerrymanders but say nothing about other superficially similar districts? Why does the Court deem some majority-minority districts unnecessary under the Voting Rights Act, or even unconstitutional, but uphold other apparently analogous districts? This Article introduces a concept — "spatial diversity" — that helps explain these and many other election law oddities. Spatial diversity refers to the variation of a given factor over geographic space. For example, a district with a normal income distribution is spatially diverse, with respect to earnings, if most rich people live in one area and most poor people live in another. But the district is spatially homogeneous if both rich and poor people are evenly dispersed throughout its territory.

Spatial diversity matters, at least in the electoral realm, because it is linked to a number of democratic pathologies. Both in theory and empirically, voters are less engaged in the political process, and elected officials provide inferior representation, in districts that vary geographically along dimensions such as wealth and race. Spatial diversity also seems to animate much of the Court's redistricting case law. It is primarily spatially diverse districts that have been condemned (in individual opinions) as political gerrymanders. Similarly, it is the spatial heterogeneity of the relevant minority population that typically explains why certain majority-minority districts are upheld by the Court while others are struck down.

After exploring the theoretical and doctrinal sides of spatial diversity, the Article aims to quantify (and to map) the concept. Using newly available American Community Survey data as well as a statistical technique known as factor analysis, the Article provides spatial diversity scores for all current congressional districts. These scores are then used: (1) to identify egregious political gerrymanders; (2) to predict which majority-minority districts might be vulnerable to statutory or constitutional attack; (3) to evaluate the Court's recent claims about various districts and statewide plans; and (4) to confirm that spatial diversity in fact impairs participation and representation. That spatial diversity can be measured, mapped, and applied in this manner underscores the concept's utility.

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INTRODUCTION

Pennsylvania's Sixth Congressional District is a suburban constituency in the eastern part of the state. Its shape is highly irregular — it has been compared to "a dragon descending on Philadelphia"[1] — and it was designed in 2002 to be a Republican-leaning open seat.[2] Pennsylvania's Eighteenth District is a suburban constituency located south of Pittsburgh. Its tentacle-like shape is also very odd, and it too was crafted to assure the election of a new Republican representative.[3] In the 2004 case of *Vieth v. Jubelirer*, Justice Souter and Justice Stevens lambasted the Sixth District, calling it "misshapen" and "grotesque" and arguing that its resident Democrats could not be represented fairly.[4] But the Justices had nothing to say about the Eighteenth District. Why not?

Texas's Twenty-Third District (in its 2002–2004 version) stretched for hundreds of miles along the Mexican border, linking El Paso in the west to Laredo in the east. Hispanics were concentrated at either end and made up a majority of the voting-eligible population. Texas's Twenty-Fifth District (in its 2004–2006 rendition) began in the border town of McAllen and extended hundreds of miles north to Austin. Hispanics again clustered on opposite ends and comprised an effective majority.[5] In the 2006 case of *League of United Latin American Citizens (LULAC) v. Perry*, the Supreme Court held that Texas violated the Voting Rights Act when it dismantled the old Twenty-Third District, and that the creation of the new Twenty-Fifth District could not remedy the violation.[6] Why was the old Twenty-Third District any better than the new Twenty-Fifth?

This Article introduces a concept — "spatial diversity" — that helps explain these and many other election law oddities. By spatial diversity, I mean the variation of a given factor over geographic space. If the factor takes on different values in different areas within a larger

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[1] Vieth v. Jubelirer, 541 U.S. 267, 340 (2004) (Stevens, J., dissenting) (quoting Appendix to Jurisdictional Statement at 135a, *Vieth*, 541 U.S. 267 (No. 02-1580)).

[2] *See* Brief for Appellants at 13, 42–44, 47–49, *Vieth*, 541 U.S. 267 (No. 02-1580) [hereinafter *Vieth* Brief]; *Pennsylvania 6th District: Chester and Montgomery Counties*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/pa/06 (last visited May 3, 2012).

[3] *See Vieth* Brief, *supra* note 2, at 13, 47–49; *Pennsylvania 18th District: Pittsburgh Metro Area*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/pa/18 (last visited May 3, 2012).

[4] *Vieth*, 541 U.S. at 330–31 (Stevens, J., dissenting); *see also id.* at 349 (Souter, J., dissenting) (noting that Sixth District might support valid political gerrymandering claim); *id.* at 272–73 (plurality opinion) (describing Pennsylvania's 2002 redistricting).

[5] *See* League of United Latin Am. Citizens v. Perry, 548 U.S. 399, 423–25 (2006) [hereinafter *LULAC*] (describing the Twenty-Third and Twenty-Fifth Districts).

[6] *See id.* at 425–43.

entity, then the entity is spatially diverse (or heterogeneous). But if the factor stays relatively constant throughout the entity's territory, then the entity is spatially non-diverse (or homogeneous).

Spatial diversity differs in important ways from conventional "top-line diversity." Consider an electoral district that is fifty percent white and fifty percent black (and that is located in a region with an identical racial makeup). This district typically would be deemed highly diverse, in terms of race, since it contains large (and proportionate) shares of both white and black voters. But this same district could be very spatially diverse *or* very spatially non-diverse depending on its geographic composition. The district would be highly spatially heterogeneous if most white voters lived in one area and most black voters lived in another. On the other hand, the district would be highly spatially homogeneous if both white and black voters were dispersed evenly throughout its territory.

Spatial diversity matters, at least in the electoral realm, because it is linked to a number of democratic pathologies. Theorists have long predicted (and empiricists have begun to confirm) that voters are less likely to engage in the political process when they are placed in districts that vary spatially along dimensions such as wealth, race, and ideology. The explanation is that voters are confused and disillusioned by districts that merge disparate geographic communities. Similarly, there is growing theoretical and empirical evidence that the quality of representation is lower in spatially heterogeneous districts. Elected officials cannot easily identify or advance their constituents' interests when those interests fluctuate widely from one portion of a district to another.

Though the Supreme Court has never used the term explicitly, the concept of spatial diversity appears repeatedly in its case law. In the political gerrymandering context, for example, several Justices have sharply criticized districts that combined highly dissimilar geographic groups. These districts struck the Justices as both inherently flawed (because of their consequences for participation and representation) and strongly suggestive that partisan line-drawing abuses had taken place.

In the racial vote dilution context, similarly, the Court's governing standard asks whether a minority population is "geographically compact" and "politically cohesive"[7] — in essence, whether the population is spatially homogeneous. Unlawful dilution occurs, in the Court's view, only when a spatially homogeneous population of sufficient size is denied its own district. And in the field of racial gerrymandering, the Court has consistently found that districts whose minority voters

[7] Thornburg v. Gingles, 478 U.S. 30, 50–51 (1986).

varied spatially in key respects were created for prohibited racial reasons. Conversely, the Court has typically upheld districts that coincided with more geographically uniform minority communities.

Despite the concept's utility, the spatial diversity of electoral districts has never previously been quantified. Courts (and scholars) thus have had to rely heavily on their own intuitions when analyzing whether districts constitute political or racial gerrymanders or dilute minority voting strength. In this Article, I introduce and calculate a measure of spatial diversity for every current congressional district in the country.[8] The measure is derived from newly released data from the American Community Survey that spans a wide array of demographic and socioeconomic attributes, and that is available (for the first time) at the Census tract level.

I first selected a large number of variables covering vital areas such as race, ethnicity, age, income, education, profession, marital status, and housing. I then used a technique known as factor analysis to condense these raw variables into a much smaller number of composite factors. These factors capture much of the original variance in the data and reveal which of the raw variables, in which combinations, best explain the residential patterns of contemporary American life. I then obtained scores for each Census tract along each of the factors. Finally, I computed the variances of these scores for the tracts within each congressional district, and then combined the variances based on the explanatory power of each factor. The end result was a single figure for each district that shows, with respect to a vast amount of information, how spatially homogeneous or heterogeneous the district is.

Of course, quantification is just the beginning of the story. Once I calculated each district's spatial diversity, first, I was able to evaluate the claims in the literature that participation and representation are impaired in spatially diverse districts. These claims turned out to be sound. The rate of voter roll-off[9] is higher in spatially diverse districts, even controlling for a host of other variables. Similarly, people's demographic and socioeconomic attributes are better predictors of their representatives' voting records in spatially homogeneous districts than in spatially heterogeneous districts. The records of politicians from geographically varied districts are driven more by partisanship and less by their constituents' actual needs and interests.

[8] More specifically, I calculate two slightly different kinds of spatial diversity: one for *all* of the residents in the districts at issue, and another solely for the districts' *minority* residents. As I explain in Part II, *infra* pp. 1924–35, the Court's redistricting case law implicates both variants of spatial diversity.

[9] Voter roll-off measures the proportion of voters who cast a ballot for a top-ticket (e.g., presidential) race, but who do not cast a ballot for a lower-ticket (e.g., congressional) race.

Second, I was able to gain some traction in the decades-old debate over how (and whether it is even possible) to identify political gerrymanders.[10] On a local scale, spatial diversity scores can be used to pinpoint problematic districts. For example, Illinois's Seventh District, which combines Chicago's affluent Gold Coast, poor black neighborhoods in the West Side, and the middle-class suburb of Oak Park, is the most spatially heterogeneous in the country. On a broader scale, the average of the spatial diversity scores of all the districts in a state can give an approximate sense of how gerrymandered the state is. Among the larger states, California has the highest average spatial diversity, while Ohio has the lowest. These statewide averages correlate in the expected direction with common measures of gerrymandering such as partisan bias and electoral responsiveness.[11]

Third, I was able to develop a potential solution to the conundrum that majority-minority districts are sometimes required by the Voting Rights Act but sometimes prohibited by the Constitution.[12] My proposal is to focus on the geographic variation of the minority voters who live within a majority-minority district. When these voters are highly spatially heterogeneous (as in Florida's Eighteenth District or Maryland's Fourth District), the district is less likely to be necessary under the Voting Rights Act, and more likely to run afoul of the Equal Protection Clause. But when these voters are highly spatially uniform (as in Michigan's Fourteenth District or New York's Sixteenth District), the district is probably both compelled by the statute and safe from constitutional attack.

Finally, I was able to revisit a number of seminal Supreme Court cases and to offer new defenses and critiques of the Court's actions. For instance, it was perfectly sensible in *Vieth* for Justice Souter and Justice Stevens to aim their fire at Pennsylvania's Sixth District, rather

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[10] This debate has raged in a series of Supreme Court cases, most notably *LULAC*, *Vieth*, and *Davis v. Bandemer*, 478 U.S. 109 (1986). It has also received extensive attention from legal academics and political scientists. *See* Nicholas O. Stephanopoulos, *Redistricting and the Territorial Community*, 160 U. PA. L. REV. 1379, 1383–84 nn.10–16 (2012) (summarizing literature on political gerrymandering).

[11] Partisan bias refers to the divergence in the share of seats that each party would win given the same share of the statewide vote. Electoral responsiveness refers to the rate at which a party gains or loses seats given changes in its statewide vote share. *See* Andrew Gelman & Gary King, *Enhancing Democracy Through Legislative Redistricting*, 88 AM. POL. SCI. REV. 541, 544–45 (1994) (defining bias and responsiveness). As expected, given the literature on the negative consequences of spatial diversity, the measure is positively correlated with bias (though only for higher levels of diversity) and negatively correlated with responsiveness.

[12] *See, e.g.*, Bush v. Vera, 517 U.S. 952, 976–83 (1996) (plurality opinion) (considering whether Voting Rights Act required majority-minority districts challenged under Equal Protection Clause); Shaw v. Hunt, 517 U.S. 899, 911–18 (1996) (same); *see also Bush*, 517 U.S. at 1037 (Stevens, J., dissenting) (discussing "schizophrenic second-guessing" that occurs when redistricters seek to comply with both Constitution and Voting Rights Act).

than at the superficially similar Eighteenth District, because the Sixth was far more spatially diverse. The Court's decision to uphold Pennsylvania's plan was also prudent since the state's districts were not, on average, particularly heterogeneous. In *LULAC*, likewise, the Court was probably right to prefer Texas's old Twenty-Third District to the new Twenty-Fifth District because the former's Hispanic population was more spatially homogeneous. But the Court may have erred in affirming the plan as a whole since it was one of the country's worst in terms of average spatial diversity.

This Article builds on an earlier work in which I argued that electoral districts should correspond, where possible, to underlying territorial communities.[13] Districts that are highly spatially diverse tend to combine disparate geographic groups, while districts that are highly spatially uniform tend to coincide with a single community. The Article also comes at an especially opportune time. The decennial redistricting cycle is currently unfolding around the country, meaning that courts, scholars, and politicians alike should be receptive to a metric that attaches a hard number to a previously ethereal concept. Just as courts in an earlier decade seized upon a measure of district compactness offered by two leading scholars,[14] it is my hope that participants in future debates will pay some heed to districts' spatial diversity.

The Article proceeds as follows: Part I elucidates the concept of spatial diversity and explains its implications for electoral districts. Part II shows how spatial diversity already animates several key lines of judicial doctrine. Finally, Part III quantifies (and maps) spatial diversity and then uses the new metric to make a series of empirical and doctrinal contributions.

I. DEFINING DIVERSITY

Few terms have meanings as diverse as "diversity" itself. Precisely because of its elusiveness, Justice Thomas once referred to it as "a faddish slogan of the cognoscenti"[15] — "more a fashionable catchphrase than . . . a useful term."[16] Even in the electoral context, one scholar has remarked that "constituency diversity . . . is a term that is often used, but seldom defined."[17]

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[13] *See* Stephanopoulos, *supra* note 10.

[14] *See* Richard H. Pildes & Richard G. Niemi, *Expressive Harms, "Bizarre Districts," and Voting Rights: Evaluating Election-District Appearances After* Shaw v. Reno, 92 MICH. L. REV. 483 (1993).

[15] Grutter v. Bollinger, 539 U.S. 306, 350 (2003) (Thomas, J., concurring in part and dissenting in part).

[16] *Id.* at 354 n.3.

[17] Joseph A. Aistrup, *Constituency Diversity and Party Competition: A County and State Level Analysis*, 57 POL. RES. Q. 267, 268 (2004); *see also* Thomas L. Brunell & Bernard Grofman,

Since this is an area in which terminology is important, I begin this Part by specifying the usual definition of diversity, at least with respect to electoral districts. In brief, districts are typically deemed diverse (or heterogeneous) when their composition resembles that of the broader population. I next introduce the concept of "spatial diversity," by which I mean the variation of a given factor over geographic space. Spatial diversity differs in crucial ways from conventional "top-line diversity." Lastly, and most significantly, I explain why spatially diverse districts are problematic. According to a growing literature, they are linked to several of the maladies that ail our democracy, yet do not generate any offsetting increases in electoral competition.

A. Top-Line Diversity

As Professor Heather Gerken has noted, when scholars and courts say that a body is diverse, "they usually mean that [it] . . . roughly mirror[s] the composition of the relevant population from which it draws its members."[18] In a region that is fifty percent Hispanic and fifty percent white (e.g., much of metropolitan Los Angeles), a district with about the same composition would be considered racially diverse, while a district that is twenty percent Hispanic or eighty percent Hispanic would not be. In a middle-class region with a typical income distribution (e.g., the Long Island suburbs), a district with a similar makeup would be seen as economically diverse, while a very rich or very poor district would not be.

This is the understanding of diversity shared by prominent scholars such as Gerken,[19] Professor Sanford Levinson,[20] and Professor Peter Schuck.[21] As Levinson puts it, an entity is diverse if it "reflects in some important sense the demographic composition of the surrounding society."[22] It is also the conception toward which the Supreme Court

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Evaluating the Impact of Redistricting on District Homogeneity, Political Competition, and Political Extremism in the U.S. House of Representatives, 1962 to 2006, *in* DESIGNING DEMOCRATIC GOVERNMENT 117, 119 (Margaret Levi et al. eds., 2008) ("District-level homogeneity is a concept that needs precise explication . . . .").

[18] Heather K. Gerken, *Second-Order Diversity*, 118 HARV. L. REV. 1099, 1102 (2005).

[19] Gerken refers to this sort of diversity as "first-order diversity." *Id.* at 1104; *see also* Heather K. Gerken, *Keynote Address: What Election Law Has to Say to Constitutional Law*, 44 IND. L. REV. 7, 15 (2010) (further discussing this notion of diversity).

[20] *See* SANFORD LEVINSON, WRESTLING WITH DIVERSITY 24 (2003).

[21] *See* PETER H. SCHUCK, DIVERSITY IN AMERICA 22–23 (2003) (noting that there is "a strong tendency to look to proportionality [between the entity and the broader population] as the measure of [diversity]").

[22] LEVINSON, *supra* note 20, at 24; *see also, e.g.*, Jeffrey F. Milem, *The Educational Benefits of Diversity: Evidence from Multiple Sectors*, *in* COMPELLING INTEREST 126, 132 (Mitchell J. Chang et al. eds., 2003) (defining structural diversity as "the numerical and proportional representation of students from different racial/ethnic groups in the student body"); Patrick S. Shin & Mitu Gulati, *Showcasing Diversity*, 89 N.C. L. REV. 1017, 1028 (2011) (assessing workforce diversity by

has seemed to gravitate (albeit skeptically). In the recent Seattle school desegregation case, for instance, a plurality of the Court characterized the city's interest as "attaining a level of diversity within [each] school[] that approximates the district's overall demographics."[23] Similarly, Justice O'Connor once analogized diversity in the ownership of broadcast stations to the "proportional representation of various races."[24]

It is true that diversity is not always equated with proportionality. Social scientists, in particular, have focused on metrics of heterogeneity that are untethered to the composition of the broader population. While several such metrics exist, the most common are the Sullivan and the Herfindahl Indices. The former measures the proportion of characteristics upon which a randomly selected pair of individuals from an entity will differ.[25] The latter calculates the probability that two randomly chosen individuals from an entity will belong to different groups.[26] The higher a body's score on either index, the more diverse it is said to be — whether or not it mirrors the society that surrounds it.

I take no position here on whether the lawyers or the social scientists have it right. The point I want to make, rather, is that all of the usual definitions of diversity take into account only the *top-line* characteristics of the entity at issue. That is, they consider only *aggregate* or *summary* statistics about the entity: the share of its population that belongs to one group or another, its average score along some dimension, the standard deviation around this average, and so forth. Re-

examining whether "the proportion of whites to racial minority groups . . . reflect[s] the proportion observed in the broader community").

[23] Parents Involved in Cmty. Sch. v. Seattle Sch. Dist. No. 1, 551 U.S. 701, 727 (2007) (plurality opinion) (quoting Joint Appendix at 42a, *Parents Involved*, 551 U.S. 701 (No. 05-908)) (internal quotation mark omitted); *see also id.* at 732 (equating "racial diversity" and "racial balance").

[24] Metro Broad., Inc. v. FCC, 497 U.S. 547, 614 (1990) (O'Connor, J., dissenting), *overruled by* Adarand Constructors, Inc. v. Pena, 515 U.S. 200, 227 (1995); *see also, e.g.*, Holland v. Illinois, 493 U.S. 474, 513 n.10 (1990) (Stevens, J., dissenting) (noting that "the diversity within our society is reflected on our juries" when "each population group is represented . . . in proportion to its strength in the population" (quoting JON M. VAN DYKE, JURY SELECTION PROCEDURES 18 (1977))); Doe v. Kamehameha Sch./Bernice Pauahi Bishop Estate, 470 F.3d 827, 842 (9th Cir. 2006) (en banc) (praising the "laudable goal of achieving diversity and proportional representation in the workplace"); Lutheran Church-Mo. Synod v. FCC, 141 F.3d 344, 356 (D.C. Cir. 1998) (describing diversity as a "justification for policies seeking racial proportionality" and a "synonym for proportional representation itself").

[25] *See, e.g.*, Aistrup, *supra* note 17, at 268; Michael Bailey & David W. Brady, *Heterogeneity and Representation: The Senate and Free Trade*, 42 AM. J. POL. SCI. 524, 536 (1998); Jon R. Bond, *The Influence of Constituency Diversity on Electoral Competition in Voting for Congress, 1974–1978*, 8 LEGIS. STUD. Q. 201, 202 (1983); Paul S. Herrnson & James G. Gimpel, *District Conditions and Primary Divisiveness in Congressional Elections*, 48 POL. RES. Q. 117, 121 (1995).

[26] *See, e.g.*, DAVID E. CAMPBELL, WHY WE VOTE 224 n.6 (2006); W. Mark Crain, *Districts, Diversity, and Fiscal Biases: Evidence from the American States*, 42 J.L. & ECON. 675, 684 (1999).

turning to the examples discussed earlier, it is the Hispanic proportion of the Los Angeles district as a whole that is compared to the Hispanic proportion of the adjoining region. Similarly, it is the average income of the entire Long Island district that is assessed relative to that of the surrounding area. And it is always district-wide percentages that are the inputs for the Sullivan and the Herfindahl Indices.

"Top-line diversity" is a perfectly appropriate metric for non-spatial units such as juries, schools, and workforces. In fact, it is hard to see how else the heterogeneity of such bodies could be evaluated. But top-line diversity misses much of the story when it comes to entities — such as states, counties, towns, and, of course, electoral districts — that are spatially defined. It tells us nothing about the *geographic* variation within these entities, nothing about the extent to which one spatial subregion might differ from another. We don't know whether the Los Angeles district is ethnically integrated throughout its territory or split into two segregated halves. We don't know whether income in the Long Island district is evenly spatially distributed or sharply divergent from one area to another. We don't know whether scores on the Sullivan and the Herfindahl Indices reflect different people living together or different people living apart. As one social scientist lamented after calculating the top-line racial diversity of several states:

> In Illinois, African Americans are concentrated in two urban areas, Chicago and East St. Louis, whereas in Virginia African Americans are much more evenly dispersed across the state . . . . On my measure of racial diversity, Illinois and Virginia will have the same score. But the strategic situation for a politician who worries about the African American vote is quite different. . . . It is difficult to envision a way of gaining statistical purchase on this kind of observation, but it is obviously relevant.[27]

B. Spatial Diversity

A major goal of this Article is to answer this lament — to correct, both conceptually and quantitatively, for the shortcomings of top-line diversity. I present below my quantitative analysis,[28] but the concept I have in mind can be articulated here: "Spatial diversity" is the variation of a given factor over geographic space. If the factor takes on relatively different values in different areas within a larger entity, then the entity is spatially diverse (or heterogeneous). But if the factor stays

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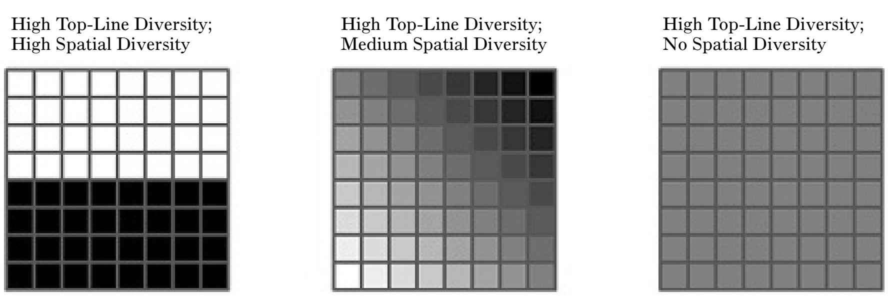
[27] PAUL GRONKE, THE ELECTORATE, THE CAMPAIGN, AND THE OFFICE 158 (2000). While this Article focuses on the spatial diversity of districts, not states, the methods it employs can be applied easily to the latter. For example, as Professor Gronke expected, Illinois is indeed about *fifty percent* more spatially heterogeneous than Virginia with respect to the African American composite factor, despite the states' similar shares of African American residents. *See infra* section III.A, pp. 1936–41 (discussing factors that emerged from nationwide statistical analysis).

[28] *See infra* Part III, pp. 1935–80.

relatively constant throughout the entity's territory, then the entity is spatially non-diverse (or homogeneous). Put another way, spatial diversity measures the variability of a larger entity's geographic subunits. If the subunits are relatively dissimilar, with respect to some variable of interest, then the entity is spatially heterogeneous, and vice versa.[29]

The following diagrams in Figure 1 show both how spatial diversity varies across different settings and how it contrasts with top-line diversity. All three figures are assumed to be, in aggregate, fifty percent white and fifty percent black; they are therefore identical in their high top-line diversity.[30] The figure on the left exhibits high spatial diversity as well, because the top half of its territory is white while the bottom half is black. The figure on the right, however, is perfectly spatially *non-diverse* (despite being highly top-line diverse) since it displays the same shade of medium gray across its entire geographic expanse. And the middle figure evinces an intermediate level of spatial diversity (again despite its high top-line diversity) since its grayness varies spatially from light to dark.

FIGURE 1: TOP-LINE AND SPATIAL DIVERSITY



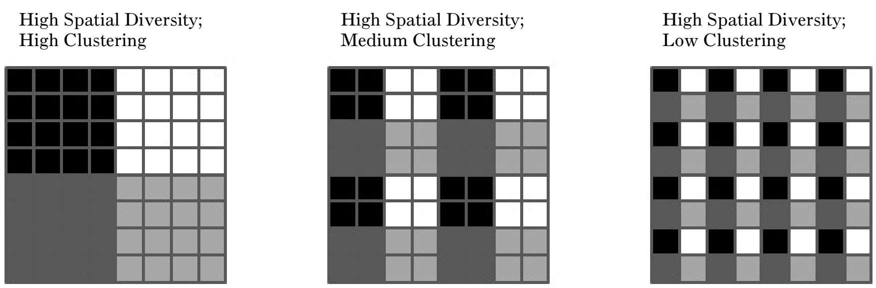
As indicated by the next set of diagrams, different geographic patterns can also give rise to the *same* degree of spatial diversity. All three figures below are equally spatially (and top-line) diverse since all

[29] Spatial diversity is thus *spatial* because it assesses the variability of the *geographic* subunits that comprise larger *geographic* entities. *See* Sean F. Reardon & Glenn Firebaugh, *Response: Segregation and Social Distance — A Generalized Approach to Segregation Measurement*, 32 SOC. METHODOLOGY 85, 86 (2002) (arguing that analogous measures of residential segregation "incorporate implicit notions of social distance"). There do exist indices that incorporate actual geographic data (e.g., latitude and longitude, distance between points, etc.), and I make some use of them below. *See infra* notes 186–88 and accompanying text (discussing my use of Global Moran's I). For the most part, though, those indices capture concepts such as centralization and concentration that are not particularly relevant to this Article's project.

[30] The color of the small constituent blocks in the diagrams corresponds to their proportion (of people, say) that is black. An entirely white block is zero percent black, a medium gray block is fifty percent black, an entirely black block is one hundred percent black, etc.

three contain identical distributions of white, light gray, dark gray, and black subunits. But the figure on the left is characterized by its high clustering, with just four large groupings occupying its entire territory. The figure on the right, in contrast, displays no clustering whatsoever, since no two adjacent areas bear the same color. And the middle figure exhibits an intermediate level of clustering, with groupings readily apparent but smaller in size. The point is that bodies that are equally spatially diverse do not necessarily have the same geographic appearance. Thanks to differences in clustering, spatial diversity itself can be a diverse phenomenon.[31]

FIGURE 2: SPATIAL DIVERSITY AND CLUSTERING



Importantly, we can recognize spatial diversity only if we have information about the spatial subunits of the entity in question. If we merely knew the aggregate characteristics of the above figures (i.e., their overall fifty-fifty composition), we would have no idea what spatial arrangements might account for those characteristics. The figures' spatial diversity can be assessed only because we know the color of the small constituent blocks. Analogously, those small blocks all seem monochromatic only because information at an even finer grain is unavailable. If we knew the color of not just the small blocks, but also the even smaller sub-blocks that must comprise *them*, then subtle new patterns would appear. An entity's level of spatial diversity is a function, at least in part, of the scale of the subunits that are taken into account.[32]

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[31] *See* Lawrence A. Brown & Su-Yeul Chung, *Spatial Segregation, Segregation Indices and the Geographical Perspective*, 12 POPULATION, SPACE & PLACE 125, 127 (2006) (displaying set of diagrams with identical segregation scores but different spatial patterns).

[32] *See* Sean F. Reardon & David O'Sullivan, *Measures of Spatial Segregation*, 34 SOC. METHODOLOGY 121, 124 & n.1 (2004); J.A. Wiens, *Spatial Scaling in Ecology*, 3 FUNCTIONAL ECOLOGY 385, 386 (1989) (noting that "different patterns emerge at different scales of investigation of virtually any . . . system"). As a general matter, spatial heterogeneity increases as the scale of the subunits under consideration decreases. *See* David W.S. Wong, *Spatial Dependency of Segregation Indices*, 41 CANADIAN GEOGRAPHER 128, 130–31 (1997). In this Article, the only sub-

It is also worth noting that top-line and spatial diversity are not entirely uncorrelated. People tend to live near other people who are similar to them (a phenomenon that geographers refer to as "Tobler's First Law"[33]). As a result, geographic clusters are relatively common, while both random and uniform spatial distributions are relatively unusual.[34] In terms of the above diagrams, the four on the left and middle are more typical than the two on the right. So when an entity is diverse in the top-line sense, it is often because it combines different geographic clusters (and thus is diverse in the spatial sense as well). And when an entity is top-line non-diverse, it is often because it is composed mostly of people from the same cluster (and thus is also spatially non-diverse). The two types of diversity are theoretically distinct, but they are not unrelated in practice.[35]

My conception of spatial diversity has certain analogues in the work of social scientists who study residential segregation. For instance, the most common measure of segregation, the Index of Dissimilarity, indicates the percentage of a group that would have to move from one geographic subunit to another in order to achieve a uniform distribution in a given area.[36] The higher the percentage that would have to move, the more segregated the area. Similarly, the Index of Isolation denotes, for a typical member of a group, the percentage of

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units that I examine are Census tracts. *See infra* notes 168–72 and accompanying text (explaining reasons for focus on tracts).

Spatial heterogeneity is also a function of the scale of the *entity* that is considered. In general, the larger the entity that is taken into account, the higher the level of spatial heterogeneity. *See* Wiens, *supra*, at 388 (noting this effect in ecological context). In this Article, I hold the scale of the entity constant by analyzing only congressional districts.

[33] Harvey J. Miller, *Tobler's First Law and Spatial Analysis*, 94 ANNALS ASS'N AM. GEOGRAPHERS 284, 284 (2004); *see* W.R. Tobler, *A Computer Movie Simulating Urban Growth in the Detroit Region*, 46 ECON. GEOGRAPHY 234, 236 (1970) ("[E]verything is related to everything else, but near things are more related than distant things."); *see also infra* p. 1940 (reporting empirical findings that all factors examined in this Article exhibit extremely high levels of spatial autocorrelation).

[34] To be more precise, clusters are common and uniform distributions are unusual when the area under examination is reasonably large (the size of a state, say). If we "zoom in" to a smaller area that happens to contain a cluster, then we will, of course, find a zone with a relatively uniform spatial composition. *See* Wiens, *supra* note 32, at 388; Wong, *supra* note 32, at 130–31. However, *random* geographic distributions are rare no matter what the scope of the inquiry.

[35] My calculations indicate that about sixty percent of the variance in congressional districts' spatial diversity scores is explained by their scores on the Sullivan Index (a common measure of top-line diversity). *See supra* note 25 and accompanying text (discussing Sullivan Index); *infra* section III.A, pp. 1936–41 (discussing methodology for calculating spatial diversity scores).

[36] *See, e.g.*, Robert R. Brischetto, *Latino Voters and Redistricting in the New Millennium*, *in* REDISTRICTING AND MINORITY REPRESENTATION 43, 56 (David A. Bositis ed., 1998); Edward L. Glaeser & Jacob L. Vigdor, *Racial Segregation: Promising News*, *in* 1 REDEFINING URBAN AND SUBURBAN AMERICA 211, 215 (Bruce Katz & Robert E. Lang eds., 2003); Philip A. Klinkner, *Red and Blue Scare: The Continuing Diversity of the American Electoral Landscape*, FORUM, June 2004, art. 2, at 6.

people in her subunit who belong to the same group.[37] Again, the higher the percentage, the higher the level of segregation.

Unlike the usual measures of top-line diversity, these indices *do* take into account data about spatial subunits. Both the Index of Dissimilarity and the Index of Isolation can be calculated only if the composition of an entity's subunits is known. However, the indices are "built around the idea of . . . well-defined *groups*," and thus cannot be applied to variables that represent something other than a group's share of the population.[38] A variable such as income, for example, cannot be analyzed directly, but rather must be decomposed into a small number of categories (e.g., percent lower than $15,000, percent higher than $150,000), in the process squandering much of the information originally conveyed by the variable.[39] Because of this limitation, I do not employ the segregation indices in the balance of the Article, though I do applaud their use of spatial subunit data.

My notion of spatial diversity is even more similar to what ecologists call "spatial heterogeneity" — a phrase I also use on occasion. By this term, ecologists mean the "variation in some factor . . . over space,"[40] where "variation" is often expressed as standard deviation, the "factor" is usually an organism's population density, and "space" is the geographic area under consideration.[41] As discussed below, I also use standard deviation to measure the variation of certain factors over the Census tracts that make up congressional districts.[42] For the sake

[37] *See, e.g.*, Brischetto, *supra* note 36, at 58; Klinkner, *supra* note 36, at 7 (discussing closely related Index of Exposure). Segregation scholars have also proposed other indices (less widely used at present) that measure the clustering, concentration, and centrality of different groups. *See, e.g.*, Brown & Chung, *supra* note 31, at 126; Douglas S. Massey & Nancy A. Denton, *Hypersegregation in U.S. Metropolitan Areas: Black and Hispanic Segregation Along Five Dimensions*, 26 DEMOGRAPHY 373, 373 (1989).

[38] Paul A. Jargowsky, *Take the Money and Run: Economic Segregation in U.S. Metropolitan Areas*, 61 AM. SOC. REV. 984, 987 (1996) (emphasis added); *see also* Reardon & Firebaugh, *supra* note 29, at 99 (noting that "all existing segregation measures require that the groups of interest be mutually exclusive and unordered"); Karl E. Taeuber & Alma F. Taeuber, *A Practitioner's Perspective on the Index of Dissimilarity*, 41 AM. SOC. REV. 884, 886 (1976) ("In order to calculate any of the segregation indexes that have been proposed, it is necessary to know the minority proportion.").

[39] *See* Jargowsky, *supra* note 38, at 987.

[40] Scott D. Cooper et al., *Quantifying Spatial Heterogeneity in Streams*, 16 J. N. AM. BENTHOLOGICAL SOC'Y 174, 174 (1997).

[41] *See id.* at 175–77; *see also, e.g.*, P.B. Adler et al., *The Effect of Grazing on the Spatial Heterogeneity of Vegetation*, 128 OECOLOGIA 465, 466 (2001); Habin Li & James F. Reynolds, *A Simulation Experiment to Quantify Spatial Heterogeneity in Categorical Maps*, 75 ECOLOGY 2446, 2446 (1994); Joan L. Riera et al., *Analysis of Large-Scale Spatial Heterogeneity in Vegetation Indices Among North American Landscapes*, 1 ECOSYSTEMS 268, 268–69 (1998).

[42] *See infra* section III.A, pp. 1936–41.

of semantic simplicity, however, I usually refer to this variation as "diversity" rather than "heterogeneity."[43]

C. Implications

Conceptual clarity is one good reason to distinguish between top-line and spatial diversity. Though loosely correlated, the two types of diversity differ in important ways, and deserve to be kept analytically distinct. A weightier rationale for caring about spatial diversity, at least with respect to electoral districts, is that it is linked to a variety of democratic injuries.[44] According to a burgeoning (though still incomplete) literature, voters are less likely to engage in the political process, and elected officials are less likely to represent their constituents effectively, in districts that vary geographically along dimensions such as wealth, race, and ideology. Moreover, such districts tend to be associated (in the aggregate) with higher levels of partisan bias, and do not appear to generate any offsetting increases in electoral competition.

To be sure, a good deal of the existing scholarship addresses either districts' top-line diversity or their degree of correspondence with political subdivisions. This work is worth acknowledging here, since top-line and spatial diversity are somewhat related, and since political subdivisions (especially smaller ones) tend to be quite homogeneous — meaning that districts that are congruent with them are usually spatially uniform as well.[45] But there is no question that the most pertinent evidence about the implications of spatial diversity is that which I present below in the empirical portion of the Article.[46] I should also clarify that I do not aim here to advance any particular theory of districting. I have expressed elsewhere my normative views on how constituencies ought to be crafted,[47] and my only goal in this section is to canvass what the literature has to say, directly or inferentially, about spatially diverse districts.

Beginning with participation, then, an array of scholars have theorized that voters become confused and disengaged when they are

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[43] *See, e.g.*, Gerken, *supra* note 18, at 1104 (using "diversity" and "heterogeneity" interchangeably); *see also* MERRIAM-WEBSTER'S COLLEGIATE DICTIONARY 584 (11th ed. 2006) (defining "heterogeneous" as "consisting of dissimilar or *diverse* ingredients or constituents" (emphasis added)).

[44] And perhaps an even weightier reason is that the Supreme Court seems to agree that spatial diversity is an undesirable district attribute. *See infra* Part II, pp. 1924–35.

[45] *See* GREGORY R. WEIHER, THE FRACTURED METROPOLIS 190 (1991) (explaining that political boundaries cause the "sorting of the population . . . by salient characteristics such as race and socioeconomic status"); *id.* at 100–08 (reporting empirical findings that municipal boundaries explain high proportion of variance with respect to age, education, and profession in several metropolitan areas); Richard Briffault, *Our Localism: Part II — Localism and Legal Theory*, 90 COLUM. L. REV. 346, 353–54 (1990).

[46] *See infra* Part III, pp. 1935–80.

[47] *See* Stephanopoulos, *supra* note 10, at 1389–1404.

placed in districts that merge dissimilar geographic groups. According to these scholars, voters do not identify naturally with districts that disregard their underlying residential patterns, and their capacity for meaningful political interaction decreases when they lack both shared interests and geographic proximity. Professor Dean Alfange, Jr., thus writes that when voters "find themselves . . . in a district overwhelmingly made up of persons from other places," they consider the experience "disorienting, deterring both political interest and political organization."[48] Professor Richard Briffault argues that district lines that "fragment neighborhoods and combine different communities into heterogeneous units" cause "a significant portion of the voters . . . [to] feel unrepresented."[49] And Professor Bernard Grofman bemoans the diminished "ability of voters to organize and mobilize [and] . . . influence their current representatives" in districts that are not geographically "cognizable."[50]

The available empirical evidence tends to support these claims. Two studies have examined how voter knowledge varies between districts that fuse or divide political subdivisions (and thus are likely to be spatially diverse) and districts that are congruent with them. Both studies found that voters are about ten percent less likely to recognize and recall candidate names in the former type of districts.[51] Similarly, a large literature connects community heterogeneity (usually in the top-line sense) to lower civic engagement. People who live in more demographically, economically, and ideologically diverse areas are less

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[48] Dean Alfange, Jr., *Gerrymandering and the Constitution: Into the Thorns of the Thicket at Last*, 1986 SUP. CT. REV. 175, 216.

[49] Richard Briffault, *Lani Guinier and the Dilemmas of American Democracy*, 95 COLUM. L. REV. 418, 431–32, 443 (1995) (book review).

[50] Bernard Grofman, *Would Vince Lombardi Have Been Right if He Had Said: "When It Comes to Redistricting, Race Isn't Everything, It's the* Only *Thing"?*, 14 CARDOZO L. REV. 1237, 1262 (1993); *see also, e.g.*, NANCY MAVEETY, REPRESENTATION RIGHTS AND THE BURGER YEARS 39 (1991) ("[V]oters are less disoriented and more capable of collective political organization when they are not fractured among a variety of districts."); Richard Morrill, *A Geographer's Perspective*, *in* POLITICAL GERRYMANDERING AND THE COURTS 212, 217 (Bernard Grofman ed., 1990) ("[C]itizens in . . . isolated parts of a district may come to feel that their community is unrepresented . . . .").

[51] *See* Richard G. Niemi et al., *The Effects of Congruity Between Community and District on Salience of U.S. House Candidates*, 11 LEGIS. STUD. Q. 187, 193 (1986); Jonathan Winburn & Michael W. Wagner, *Carving Voters Out: Redistricting's Influence on Political Information, Turnout, and Voting Behavior*, 63 POL. RES. Q. 373, 379 (2010). Voters are also less informed about candidates in districts that do not correspond closely to media markets (and thus are likely as well to be spatially diverse). *See* James E. Campbell et al., *Television Markets and Congressional Elections*, 9 LEGIS. STUD. Q. 665, 671 (1984); Dena Levy & Peverill Squire, *Television Markets and the Competitiveness of U.S. House Elections*, 25 LEGIS. STUD. Q. 313, 319 (2000); James M. Snyder Jr. & David Strömberg, *Press Coverage and Political Accountability*, 118 J. POL. ECON. 355, 379–80 (2010).

likely to vote,[52] to participate in associational activities,[53] to trust their fellow citizens,[54] to view minority groups favorably,[55] and even to fill out their Census forms.[56] In an earlier work of mine, I too found that voter turnout and trust in government are higher in states that are legally obligated to draw districts that correspond to geographic communities. These differences remain significant even after controlling for a range of other variables.[57]

Turning to representation, several academics have theorized that elected officials cannot easily identify or advance their constituents' interests when those interests vary widely by location. The officials often receive different political signals from different geographic groups, and their actions tend to please some groups but to antagonize others. Professor Bruce Cain thus writes that if a district is spatially "divided between nonwhite and white, rich and poor, rural and urban," "then it may be very hard for one representative to represent all factions well."[58] Professor Richard Morrill argues that "[i]f districts ignore the neighborhood or community within which most people carry out their daily lives," then politicians "may be faced with difficult conflicts of interest between people in disparate parts of the district."[59] And Professor Thomas Brunell contends that "the more homogeneous a district, the better able the elected official is to accurately reflect the views of more of his constituents."[60]

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[52] *See, e.g.*, CAMPBELL, *supra* note 26, at 23–24; Dora L. Costa & Matthew E. Kahn, *Civic Engagement and Community Heterogeneity: An Economist's Perspective*, 1 PERSP. ON POL. 103, 107 (2003).

[53] *See, e.g.*, Alberto Alesina & Eliana La Ferrara, *Participation in Heterogeneous Communities*, 115 Q.J. ECON. 847, 850 (2000); Costa & Kahn, *supra* note 52, at 105; *cf.* J. ERIC OLIVER, DEMOCRACY IN SUBURBIA 87–88, 131 (2001) (finding that economic homogeneity of cities is negatively correlated with civic participation, but that racial homogeneity is positively correlated).

[54] *See, e.g.*, Alberto Alesina & Eliana La Ferrara, *Who Trusts Others?*, 85 J. PUB. ECON. 207, 222 (2002); Costa & Kahn, *supra* note 52, at 105–06; Robert D. Putnam, E Pluribus Unum*: Diversity and Community in the Twenty-First Century*, 30 SCANDINAVIAN POL. STUD. 137, 147–49 (2007).

[55] *See, e.g.*, Rene R. Rocha & Rodolfo Espino, *Racial Threat, Residential Segregation, and the Policy Attitudes of Anglos*, 62 POL. RES. Q. 415, 422–23 (2009) (finding that, for a given Hispanic share of the population in a metropolitan area, Anglos had more hostile views toward Hispanics if the area was ethnically segregated (i.e., spatially diverse) than if it was ethnically integrated); *see also* Donald R. Kinder & Tali Mendelberg, *Cracks in American Apartheid: The Political Impact of Prejudice Among Desegregated Whites*, 57 J. POL. 402, 419 (1995) (finding that whites are less prejudiced toward blacks in racially integrated areas).

[56] *See, e.g.*, Jacob L. Vigdor, *Community Composition and Collective Action: Analyzing Initial Mail Response to the 2000 Census*, 86 REV. ECON. & STAT. 303, 307 (2004).

[57] *See* Stephanopoulos, *supra* note 10, at 1464–67.

[58] BRUCE E. CAIN, THE REAPPORTIONMENT PUZZLE 63 (1984); *see also id.* at 39.

[59] Morrill, *supra* note 50, at 216–17.

[60] THOMAS L. BRUNELL, REDISTRICTING AND REPRESENTATION 26 (2008) (referring primarily to political homogeneity); *see also* JONATHAN S. KRASNO, CHALLENGERS, COMPETITION, AND REELECTION 38, 59 (1994); Charles Backstrom et al., *Establishing a Statewide*

Once again, the available empirics largely bear out these claims. In two well-known series of interviews carried out by political scientists, elected officials in Congress[61] and state legislatures[62] repeatedly stated that they found it difficult to represent spatially diverse districts. House members complained that they could not easily discern the "lowest common denominator of interests" in geographically varied districts,[63] while state legislators expressed frustration that they "simply [could not] 'represent' the views of . . . diverse groups when there are sharp conflicts."[64] More conventional studies confirm that representation (in the sense of responsiveness to constituent interests) is inversely related to districts' top-line demographic, economic, and ideological diversity. Key constituency characteristics[65] and the position of the median voter[66] are worse predictors of elected officials' voting patterns in heterogeneous districts than in homogeneous districts. It is partisan affiliation, not voters' attributes or opinions, that best explains the behavior of representatives from heterogeneous districts.[67]

Beyond their implications for participation and representation, spatially homogeneous districts should produce the same systemic benefits that Gerken has identified for districts that are "second-order diverse." By this term, Gerken means districts that are non-diverse in the top-line sense but that differ substantially from one another. She means

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Electoral Effects Baseline, *in* POLITICAL GERRYMANDERING AND THE COURTS, *supra* note 50, at 145, 153. However, while it may be difficult for representatives to serve as *delegates* for spatially diverse districts, it may be easier for them to serve as *trustees*. According to the traditional delegate/trustee dichotomy, representatives who are delegates abide by the expressed preferences of their constituents, while representatives who are trustees make their own autonomous policy decisions. *See generally* HANNA FENICHEL PITKIN, THE CONCEPT OF REPRESENTATION (1967).

[61] *See* RICHARD F. FENNO, JR., HOME STYLE: HOUSE MEMBERS IN THEIR DISTRICTS (1978); Richard F. Fenno, Jr., *U.S. House Members in Their Constituencies: An Exploration*, 71 AM. POL. SCI. REV. 883 (1977).

[62] *See* MALCOLM E. JEWELL, REPRESENTATION IN STATE LEGISLATURES (1982).

[63] Fenno, *supra* note 61, at 885; *see also* FENNO, *supra* note 61, at 1–8.

[64] JEWELL, *supra* note 62, at 117; *see also id.* at 55–60, 115–20; *cf.* J. Vincent Buck & Bruce E. Cain, *British MPs in Their Constituencies*, 15 LEGIS. STUD. Q. 127, 138–39 (1990) (describing analogous views of British Parliament members from spatially diverse districts).

[65] *See* Bailey & Brady, *supra* note 25, at 537 (studying senators' votes on free trade issues); Christopher Dennis et al., *Constituency Diversity and Congress: The Case of NAFTA*, 29 J. SOCIO-ECON. 349, 355 (2000) (same).

[66] *See* Elisabeth R. Gerber & Jeffrey B. Lewis, *Beyond the Median: Voter Preferences, District Heterogeneity, and Political Representation*, 112 J. POL. ECON. 1364, 1376–78 (2004) (studying legislators' votes in Los Angeles County).

[67] *See* Bailey & Brady, *supra* note 25, at 526; Gerber & Lewis, *supra* note 66, at 1376; *see also* Crain, *supra* note 26, at 689 (finding that representatives from heterogeneous districts do not make as great an effort to win district-specific projects); Snyder & Strömberg, *supra* note 51, at 395–99 (finding that representatives from districts that are more congruent with media markets are less loyal to their parties and hence less polarized).

high variation *among* districts rather than *within* them.[68] In her view, such variation is desirable because it allows minority groups to exercise control rather than mere influence — to actually elect the representatives of their choice in some districts.[69] It is also desirable because it results in the election of a legislature that reflects the entire spectrum of views held by the people (and not just the perspective of the median voter).[70]

Spatially homogeneous districts are typically second-order diverse because inter-district variation tends to increase as intra-district geographic variation decreases. With respect to a given variable, that is, districts usually differ more from one another when they are drawn to be internally spatially uniform. The variation that exists in the variable generally manifests itself *among* districts when it is not expressed geographically *within* districts.[71] As a result, all of the advantages that Gerken posits for second-order diverse districts should also accrue to spatially homogeneous districts. They too should assist minorities of all stripes and give rise to a pluralistic legislature that, as John Adams famously put it, resembles a "portrait, in miniature, of the people at large."[72]

A further benefit of spatially homogeneous districts is that, according to a number of studies, they may be associated with lower levels of partisan bias.[73] It is true that the geographic variation of an *individual* district cannot be connected easily to a particular electoral outcome. But when all of the districts in a state are considered in the aggregate, their average degree of spatial diversity provides some indication of how fairly the state's plan treats the major parties. A high statewide

[68] *See* Gerken, *supra* note 18, at 1102–03 ("Second-order diversity involves variation among decisionmaking bodies, not within them. It favors *inter*organizational heterogeneity, not *intra*-organizational heterogeneity.").

[69] *See id.* at 1124–32; *see also* Richard Thompson Ford, *Geography and Sovereignty: Jurisdictional Formation and Racial Segregation*, 49 STAN. L. REV. 1365, 1369 (1997) (arguing for "the inversion of James Madison's extended sphere . . . to allow one group some degree of autonomy").

[70] *See* Gerken, *supra* note 18, at 1104, 1161; *see also* Steven Callander, *Electoral Competition in Heterogeneous Districts*, 113 J. POL. ECON. 1116, 1118–19 (2005) (showing that parties grow more divergent as inter-district heterogeneity increases).

[71] *See* Reardon & O'Sullivan, *supra* note 32, at 124 n.1 (noting that subunits that are "relatively homogeneous internally" tend to "exaggerate [measures of] segregation" among subunits); Wiens, *supra* note 32, at 388 (observing that as subunits become more internally diverse, "a greater proportion of the spatial heterogeneity of the system is contained within [the subunits] and is lost to our resolution").

[72] PITKIN, *supra* note 60, at 60 (quoting Letter from John Adams to John Penn (Jan. 1776), *reprinted in* 4 JOHN ADAMS, THE WORKS OF JOHN ADAMS 205 (1851)); *see also* James A. Gardner, *Foreword: Representation Without Party: Lessons from State Constitutional Attempts to Control Gerrymandering*, 37 RUTGERS L.J. 881, 957 (2006) (noting that "where district voters are [relatively] homogeneous, all conflict resolution occurs in the legislature and none in the electorate").

[73] *See supra* note 11 (defining partisan bias).

average suggests that natural geographic alignments were disrupted in the pursuit of partisan advantage. In contrast, a low average implies that traditional districting criteria, several of which favor spatial homogeneity,[74] took precedence over partisan aggression.

The most notable academic finding in this vein is that partisan bias tends to increase as a state's districts become less congruent with political subdivisions (and thus more spatially diverse). In the last decade, for instance, states that bar districts from dividing subdivisions adopted plans that more accurately reflected the major parties' underlying strength than states without such bars.[75] Similarly, if the district plans of various Midwestern swing states were redrawn so as to minimize subdivision splits,[76] or so as to mirror spatial voting patterns in popular initiatives,[77] then almost identical proportions of districts would lean toward each major party. And in an earlier work of mine, I found that states required to draw districts that coincide with geographic communities exhibit lower levels of bias than states lacking such requirements.[78]

The most common defense of spatially diverse districts, of course, is that they are necessary to foster electoral competition. Competition is essential to a properly functioning democracy,[79] the argument goes, and heterogeneous districts are more likely to be competitive than homogeneous districts.[80] Fortunately, we do not actually have to choose between homogeneity and competition. It turns out, empirically, that the two characteristics are weakly correlated, if at all, and that it might be more geographically *uniform* districts that in fact are more

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[74] For example, adherence to both political subdivisions and geographic communities of interest tends to produce districts that are relatively spatially homogeneous. *See supra* note 45 and accompanying text; *infra* notes 122, 217.

[75] *See* JONATHAN WINBURN, THE REALITIES OF REDISTRICTING 200–01 (2008) (concluding that bars on splitting political subdivisions constrain political gerrymandering).

[76] *See* MICHAEL P. MCDONALD, MIDWEST MAPPING PROJECT 22–186 (2009), *available at* http://elections.gmu.edu/Midwest_Mapping_Project.pdf (providing data showing that average proportion of Democratic-leaning districts would increase, according to my calculations, from forty percent to forty-nine percent).

[77] *See* Todd Makse, Defining "Communities of Interest" in Redistricting Through Initiative Voting 11 tbl.4 (Dec. 2011) (unpublished manuscript), *available at* http://users.dickinson.edu/~makset/coi.pdf (showing that proportion of Democratic-leaning congressional districts in Ohio would increase from thirty-three percent to forty-four percent).

[78] *See* Stephanopoulos, *supra* note 10, at 1457–62.

[79] In the legal academy, Professors Samuel Issacharoff and Richard Pildes have sung the praises of electoral competition most loudly. *See, e.g.*, Samuel Issacharoff, *Gerrymandering and Political Cartels*, 116 HARV. L. REV. 593 (2002); Samuel Issacharoff & Richard H. Pildes, *Politics as Markets: Partisan Lockups of the Democratic Process*, 50 STAN. L. REV. 643 (1998); Richard H. Pildes, *The Constitution and Political Competition*, 30 NOVA L. REV. 253 (2006).

[80] *See, e.g.*, Aistrup, *supra* note 17, at 267 (claiming basis in Madisonian political theory for view that "party competition develops in response to constituency diversity"); Herrnson & Gimpel, *supra* note 25, at 120 (same).

competitive. In particular, several studies have found that competitiveness in both general[81] and primary[82] elections is unrelated to constituencies' top-line demographic, economic, and ideological diversity, and that quality challengers are no more likely to materialize in heterogeneous districts than in homogeneous districts.[83] A few diverging results have been reported, but they do not directly dispute the emerging consensus,[84] and appear to be relative outliers.

The evidence that competition might be greater in spatially uniform districts comes primarily from studies analyzing how well districts correspond to geographic entities such as political subdivisions and media markets. The studies find that challengers' name recognition increases as districts become more congruent with these entities, and that the rise is greater for them than for incumbents.[85] The studies also find that challengers' vote shares — perhaps the best measure of competitiveness — are typically higher in the more congruent districts.[86] The explanation is that "[w]ith the greater information flow in congruent districts, the incumbents' prominence and campaign finances are less important," and so challengers are better able to convey their messages to the electorate.[87] In a previous work, I too determined that states that draw districts corresponding to geographic communities enjoy higher levels of electoral responsiveness than states that do not.[88]

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[81] *See* KRASNO, *supra* note 60, at 62, 69; Bond, *supra* note 25, at 206; Brunell & Grofman, *supra* note 17, at 122–26; William Koetzle, *The Impact of Constituency Diversity upon the Competitiveness of U.S. House Elections, 1962–96*, 23 LEGIS. STUD. Q. 561, 564 (1998); Michael P. McDonald, *Redistricting Institutions and Competition in U.S. House Districts*, *in* DESIGNING DEMOCRATIC GOVERNMENT, *supra* note 17, at 141, 149–52.

[82] *See* Robert E. Hogan, *Sources of Competition in State Legislative Primary Elections*, 28 LEGIS. STUD. Q. 103, 115 (2003); Tom W. Rice, *Gubernatorial and Senatorial Primary Elections: Determinants of Competition*, 13 AM. POL. Q. 427, 438 (1985).

[83] *See* GRONKE, *supra* note 27, at 97; Jon R. Bond et al., *Explaining Challenger Quality in Congressional Elections*, 47 J. POL. 510, 525 (1985); Michael J. Ensley et al., *District Complexity as an Advantage in Congressional Elections*, 53 AM. J. POL. SCI. 990, 998 (2009).

[84] *See* Aistrup, *supra* note 17, at 273 (finding that socioeconomic diversity increases competitiveness but that racial diversity decreases it); Herrnson & Gimpel, *supra* note 25, at 128 (finding that heterogeneity is associated with competitiveness in Democratic but not in Republican primary elections).

[85] *See* Campbell et al., *supra* note 51, at 672–73; Levy & Squire, *supra* note 51, at 317; Niemi et al., *supra* note 51, at 193.

[86] *See* Campbell et al., *supra* note 51, at 673; Levy & Squire, *supra* note 51, at 321.

[87] Campbell et al., *supra* note 51, at 667; *see also* Levy & Squire, *supra* note 51, at 315; Niemi et al., *supra* note 51, at 193.

[88] *See* Stephanopoulos, *supra* note 10, at 1457–62; *see also* DOUGLAS JOHNSON, COMPETITIVE DISTRICTS IN CALIFORNIA: A CASE STUDY OF CALIFORNIA'S REDISTRICTING IN THE 1990S 4, 7–9 (2005), *available at* http://www.claremontmckenna.edu/rose/publications/pdf/rose_ca_case_study.pdf (finding high level of competitiveness when California's districts were drawn in the 1990s to correspond to geographic communities); MCDONALD, *supra* note 76, at 22–186 (finding that number of competitive districts generally increases when five Midwestern states'

Accordingly, the spatial diversity of electoral districts matters because it is linked, at least by implication, to lower voter participation, to impaired representation, to higher partisan bias, and perhaps even to less competitive elections. Spatial diversity matters, in other words, because it is something to be avoided. Later in the Article, I analyze geographic heterogeneity directly — not through proxies such as topline diversity and congruence with political subdivisions — and I confirm empirically many of the hypotheses latent in the literature.[89] But first, in the next Part, I explore how the Supreme Court's intuitions about spatially diverse districts animate several key lines of doctrine.

II. DOCTRINAL MANIFESTATIONS

Supreme Court Justices are not political scientists. Their opinions do not reveal (nor should be expected to reveal) any particular familiarity with the scholarship on districting and its consequences.[90] Nevertheless, the Court has seemed to intuit, in many election law cases over many years, that spatial diversity is an undesirable district attribute. In the political gerrymandering context, individual Justices have seen spatially diverse districts as red flags that partisan shenanigans were afoot. In the racial vote dilution context, the Court as a whole has held that only spatially homogeneous minority populations are entitled to districts in which they can elect the representatives of their choice. And in the realm of racial gerrymandering, the Court has reliably struck down districts whose minority voters varied geographically in key respects, while upholding districts that coincided with more uniform minority communities.

In this Part, I trace the thread of spatial diversity through the Court's redistricting decisions. My goal in doing so is more interpretive than normative. I do not propose any new standard for the Court to adopt; instead I seek to offer a new lens (with a geographic focus) through which a large body of doctrine can be better understood.[91] My account of the Court's case law is also somewhat reductionist. There are many themes that have made appearances over the years in

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districts are redrawn so as to minimize splits of counties and census places); Vladimir Kogan & Eric McGhee, Redistricting California: An Evaluation of the Citizens Commission Final Plans 5–6, 22–24 (Sept. 13, 2011) (unpublished manuscript), *available at* http://igs.berkeley.edu/politics/redistricting_california.pdf (finding greater competitiveness for new California districts drawn by independent commission with preservation of geographic communities as key criterion).

[89] *See infra* Part III, pp. 1935–80.

[90] For instance, the Court has never cited any of the empirical studies discussed above in section I.C, pp. 1917–24.

[91] In a previous work, I have made the normative argument that the Court *should* combat political gerrymandering by requiring districts to correspond, where possible, to organic geographic communities. *See* Stephanopoulos, *supra* note 10.

the Justices' opinions. But here I pay attention only to one — albeit an important one that has not previously been recognized.

A. Political Gerrymandering

The Court has conspicuously failed to devise a workable test for identifying unconstitutional political gerrymanders. In the 1980s, the Court adopted a standard — whether a district plan "consistently degrade[s] . . . voters' influence on the political process as a whole"[92] — that proved almost impossible to satisfy.[93] More recently, the Court explicitly rejected this standard, as well as a host of other candidates, but was unable to settle on any replacement.[94] Four Justices now believe that political gerrymandering is intrinsically nonjusticiable, while the other five are divided as to what a theoretically defensible and judicially manageable approach might be.[95]

While judicial diffidence is the headline of this doctrinal story,[96] one of its major subheadings is the criticism that several Justices have leveled at spatially diverse districts. This criticism has been directed at both the political machinations that often explain the creation of such districts and the districts' implications for important democratic values. Notably, no Court majority (or plurality) has ever risen to the *defense* of geographic heterogeneity. The invalidation of highly spatially diverse districts is thus one of the very few approaches that the Court could adopt to combat gerrymandering without having to reverse its own precedents.

Justice Stevens's concurrence and Justice Powell's dissent in the 1983 case of *Karcher v. Daggett*[97] were both the first Court opinions to discuss gerrymandering at length and the first to condemn spatially diverse districts. (The majority decided the case, which involved a pro-Democratic gerrymander in New Jersey, purely on one-person, one-vote grounds.[98]) Justice Stevens singled out several geographically varied districts as evidence that the state's Democrats had deliberately sought to handicap their opponents. One heavily Republican district "stretch[ed] from the New York suburbs to the rural upper reaches of the Delaware River," dividing seven counties along the way.[99] Another

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[92] Davis v. Bandemer, 478 U.S. 109, 132 (1986) (plurality opinion).

[93] *See* Vieth v. Jubelirer, 541 U.S. 267, 281–84 (2004) (plurality opinion) (criticizing the approach of the *Bandemer* plurality).

[94] *See id.* at 281–301; *see also LULAC*, 548 U.S. 399, 414–23 (2006) (opinion of Kennedy, J.).

[95] *See Vieth*, 541 U.S. at 292–305 (plurality opinion).

[96] *See id.* at 341 (Stevens, J., dissenting) (decrying the Court's "failure of judicial will").

[97] 462 U.S. 725 (1983).

[98] *See id.* at 744.

[99] *Id.* at 762 (Stevens, J., concurring) (quoting Barry Light, *New Jersey Map Imaginative Gerrymander*, 40 CONG. Q. WKLY. REP. 1190, 1193 (1982)) (internal quotation mark omitted). The district was thus spatially diverse with respect to residential type (suburban versus rural).

problematic district traced "a curving partisan path through industrial Elizabeth, liberal, academic Princeton and largely Jewish Marlboro in Monmouth County."[100] Still another "stretche[d] all over the map, from the Philadelphia suburbs in Camden County to the New York suburbs in Monmouth County."[101] All of these districts were spatially diverse because they merged dissimilar geographic groups. And, not surprisingly, all of them were "designed to increase the number of Democrats, and to decrease the number of Republicans, that New Jersey's voters would send to Congress."[102]

Justice Powell focused his comments on the impact of the constituencies' geographic variation on participation and representation. Echoing some of the academic literature,[103] he argued that "[a] legislator cannot represent his constituents properly — nor can voters from a fragmented district exercise the ballot intelligently — when a voting district is nothing more than an artificial unit."[104] He also expressed his disapproval of district lines that do not "reflect any consideration of the likely effect on the quality of representation" and that are "likely to confound the Congressmen themselves."[105] For him, spatial diversity was thus not just a sign that partisan line-drawing abuses might have occurred; it was a troublesome district trait in its own right.

Justice Powell reprised many of the same points in his separate opinion in the 1986 case of *Davis v. Bandemer*,[106] which involved a pro-Republican gerrymander in Indiana. With respect to participation, he contended that "the potential for voter disillusion . . . is great"[107] and "[c]onfusion inevitably follows . . . when a citizen finds himself or herself forced to associate [in a district] with several artifi-

[100] *Id.* at 762–63 (quoting Light, *supra* note 99, at 1193–95) (internal quotation mark omitted). The district was thus spatially diverse with respect to industrial employment, academic orientation, and religion.

[101] *Id.* at 763 n.31 (quoting Light, *supra* note 99, at 1198) (internal quotation mark omitted). As long as the two metropolitan areas' suburbs differed from each other in important respects, then this district too was spatially diverse. *See id.* at 764 n.33 (noting that in several districts "different television and radio stations, different newspapers, and different transportation systems serve the northern and southern localities" (quoting Daggett v. Kimmelman, 535 F. Supp. 978, 984 (D.N.J. 1982) (three-judge court) (Gibbons, J., dissenting))).

[102] *Id.* at 764.

[103] *See supra* section I.C, pp. 1917–24.

[104] *Karcher*, 462 U.S. at 787 (Powell, J., dissenting).

[105] *Id.* at 789; *see also id.* at 787 n.3 (arguing that when a district corresponds to a community, the "Representative . . . knows the needs of his district and is more responsive to them"); *id.* at 789 (criticizing "contorted Districts" that do not "reflect any attempt to follow natural, historical, or local political boundaries").

[106] 478 U.S. 109 (1986).

[107] *Id.* at 177 (Powell, J., concurring in part and dissenting in part) (quoting Bandemer v. Davis, 603 F. Supp. 1479, 1494 (S.D. Ind. 1984) (three-judge court)) (internal quotation marks omitted).

cial communities."[108] Similarly, he asserted that representation is more effective in districts that correspond to political subdivisions because they "allow communities to have a voice in the legislature that directly controls their local interests."[109] As in *Karcher*, he was at least as concerned about the quality of self-government in spatially diverse constituencies as about their partisan consequences.

On a more granular level, Justice Powell reserved his harshest language for Indiana's most geographically varied districts. One district provoked his ire because it combined the urban "residents of downtown Fort Wayne" with rural "Allen and Noble County farmers."[110] Another district was offensive because "it is difficult to conceive the interests shared by blacks in Washington Township and white suburbanites in Hamilton and Boone Counties."[111] And perhaps "the most grievous example of the political cartographer's handiwork" was an Indianapolis district that joined "portions of the urban southwestside of the city, the airport and suburban area . . . on the west side, and the Meridian Hills area at the northern part of the county."[112] These spatially diverse districts were all "designed to and did discriminate against Democrats," and were incompatible, according to Justice Powell, with a "democracy [that] can work well and fairly."[113]

In part because of the parties' litigation strategies, spatial diversity did not play as prominent a role in the Court's two most recent gerrymandering cases, *Vieth v. Jubelirer*[114] in 2004 and *LULAC*[115] in 2006. However, both Justice Souter and Justice Stevens criticized Pennsylvania's Sixth Congressional District in *Vieth* because it "split[] up towns and communities throughout Montgomery and Berks Counties," needlessly increasing both its own heterogeneity and that of its neigh-

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108 *Id.* at 173 n.13; *see also id.* at 174 n.13 ("[I]rrational lines themselves affect the ability of all voters to exercise their political influence . . . .").

109 *Id.* at 167 (referring to districts that adhere to community boundaries).

110 *Id.* at 177 (quoting *Bandemer*, 603 F. Supp. at 1487) (internal quotation mark omitted). The district was thus spatially diverse with respect to residential type (urban versus rural).

111 *Id.* (quoting *Bandemer*, 603 F. Supp. at 1487) (internal quotation mark omitted). The district was thus spatially diverse with respect to race.

112 *Id.* at 180 n.21 (quoting *Bandemer*, 603 F. Supp. at 1487) (internal quotation mark omitted). The district was thus spatially diverse with respect to residential type (urban versus suburban). *See also id.* at 176–77 (criticizing district that "plac[ed] the seat of one county in a voting district composed of townships from other counties"); *id.* at 180 (noting that "the mapmakers split Fort Wayne . . . and associated each of the halves with areas from outlying counties").

113 *Id.* at 169, 173 n.13.

114 The appellants in *Vieth* focused on statewide rather than district-specific claims. *See* Vieth v. Jubelirer, 541 U.S. 267, 355 (2004) (Souter, J., dissenting).

115 548 U.S. 399 (2006). The appellants in *LULAC* emphasized the mid-decade timing of Texas's redistricting. *See id.* at 413–14; *id.* at 414–23 (opinion of Kennedy, J.). As discussed below, spatial diversity *did* play a crucial role in the vote dilution portion of the Court's decision. *See infra* pp. 1931–32.

boring districts.[116] Justice Stevens added that the "grotesque configuration of [the Sixth District] imposes a special harm" on its residents, namely that "the[ir] representative will perceive that the people who put her in power are those who drew the map rather than those who cast ballots."[117] Spatial diversity thus does not inflict democratic injuries *directly*, in his view, but rather at one remove through the highly partisan message that it sends to both voters and elected officials.

Justice Stevens had a similar reaction in *LULAC* to a set of Texas districts that were highly spatially varied with respect to race. In order to defeat a longtime Democratic incumbent, these districts "fragmented" a minority community that previously had been placed in a single constituency,[118] "splinter[ing] and submerg[ing it] into majority Anglo districts in the Dallas-Fort Worth area."[119] The result was not only a Republican advantage in the new districts, but also an erosion of the "crucial assumption" that "representatives . . . will act as vigorous advocates for the needs and interests" of all their constituents, whatever their party.[120] The representational bond was attenuated, that is, by the message of partisan manipulation that was conveyed by the districts' high geographic variation.

It is true that spatial diversity is by no means the touchstone of the Court's gerrymandering case law. It has appeared only in individual Justices' opinions — typically in discussions of districts that divided political subdivisions or fused dissimilar geographic groups[121] — and a majority of the Court has never explicitly referred to it. My argument is simply that the concept *has* repeatedly manifested itself (a point the literature to date has missed), and that its utility has never been questioned by the Court (thus distinguishing it from the many standards that already have been rejected). Spatial diversity, in other words, has both firm doctrinal roots and a plausible doctrinal future.[122]

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[116] *Vieth*, 541 U.S. at 340 (Stevens, J., dissenting) (quoting Appendix to Jurisdictional Statement, *supra* note 1, at 136a) (internal quotation mark omitted); *id.* at 349 (Souter, J., dissenting) (same); *see also id.* (noting that Montgomery County was divided into six different districts); Erfer v. Commonwealth, 794 A.2d 325, 342 (Pa. 2002) (Zappala, C.J., dissenting) (noting that Sixth District "combines the relatively unrelated rural parts of Chester and Berks County with the 'densely settled suburban' communities of . . . Montgomery County" (quoting trial transcript)).

[117] *Vieth*, 541 U.S. at 331 (Stevens, J., dissenting); *see also id.* at 328 (noting the "more individualized representation injury to [the plaintiff] as a resident of District 6").

[118] *LULAC*, 548 U.S. at 454 (Stevens, J., concurring in part and dissenting in part).

[119] *Id.* at 479 (quoting Dep't of Justice, Section 5 Recommendation Memorandum 67 (Dec. 12, 2003), *available at* http://www.washingtonpost.com/wp-srv/nation/documents/texasDOJmemo.pdf) (internal quotation mark omitted). Justice Stevens would have invalidated these districts on political gerrymandering grounds, not because of racial vote dilution. *See id.* at 481.

[120] *Id.* at 470.

[121] *See* Stephanopoulos, *supra* note 10, at 1421–24 (discussing political gerrymandering cases through prism of community disruption rather than spatial diversity).

[122] The concept of spatial diversity is even more salient in the case law on whether state community-of-interest provisions have been followed. Five states include such provisions in their

B. Racial Vote Dilution

There is no need to be so circumspect about the role of spatial diversity in the racial vote dilution context. In this field, under both the Equal Protection Clause and section 2 of the Voting Rights Act[123] (VRA), the Court has consistently held that minority populations are legally entitled to districts in which they can elect the representatives of their choice only if they are spatially homogeneous. Minority voters who vary geographically along key dimensions need not be placed in the same district — and if they *are* placed in the same district, that district cannot remedy any vote dilution that may have occurred. Spatial homogeneity is thus a prerequisite for both establishing and curing vote dilution.

I should note that, consistent with the Court's case law, I use spatial diversity in a slightly different sense here than in the preceding discussion of political gerrymandering. In the gerrymandering arena, the Court's decisions examine the geographic variation of *all* the people who live in the districts at issue. But in the realm of race and redistricting, the Court's focus (and mine) is only on the spatial heterogeneity of the *minority* residents of the relevant districts. The

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constitutions, seven more have analogous statutory requirements, and a further twelve adopted non-binding guidelines along similar lines during the last redistricting cycle. The provisions are aimed at preventing gerrymandering, and they typically require districts to correspond, where possible, to geographic communities of interest, i.e., "the shared social, cultural, and economic interests of people living in a particular area." *Id.* at 1425; *see also id.* at 1424–1428.

State courts enforcing community-of-interest requirements have repeatedly invalidated districts that were highly spatially diverse along key dimensions. The spatial diversity of these districts was a strong indication that they did not in fact correspond to geographic communities of interest. *See, e.g.*, Hickel v. Se. Conference, 846 P.2d 38, 51 (Alaska 1992) (striking down district that "mixes the small, rural, Native communities with the urban areas of Ketchikan and Sitka"); *In re* Reapportionment of Colo. Gen. Assembly, 647 P.2d 209, 212 (Colo. 1982) (striking down district due to "cultural differences of religion, ethnicity, age and life-style between those parts of northwest Denver and east-central Denver encompassed within district"); *In re* Apportionment of Towns of Hartland, Windsor & W. Windsor, 624 A.2d 323, 331 (Vt. 1993) (striking down district that merged socially and economically distinct towns on opposite sides of mountain range). Conversely, state courts have frequently upheld districts that were more spatially homogeneous in terms of important variables. These districts' greater geographic uniformity suggested that they were indeed congruent with underlying territorial communities. *See, e.g.*, *In re* 2001 Redistricting Cases, 44 P.3d 141, 145 (Alaska 2002) (upholding district whose various regions shared "their involvement in the commercial fishing industry"); Beauprez v. Avalos, 42 P.3d 642, 652 (Colo. 2002) (upholding district composed of "western slope counties" containing a "historical Hispanic community of interest"); Hartung v. Bradbury, 33 P.3d 972, 981 (Or. 2001) (upholding district made up of "small communities that have a rural resource economy and share agricultural and timber interests" (quoting Oregon Secretary of State Bill Bradbury)).

[123] 42 U.S.C. § 1973 (2006). Under the Court's canonical construction of section 2, minority groups are entitled to districts in which they can elect the representatives of their choice if (1) the groups are sufficiently large and geographically compact to constitute majorities in single-member districts; (2) they are politically cohesive; and (3) significant racial polarization in voting exists — and if a totality-of-the-circumstances inquiry also supports the groups' claims. *See* Thornburg v. Gingles, 478 U.S. 30, 49–51, 79–80 (1986).

districts' *non-minority* inhabitants — whom scholars have dubbed the "filler people"[124] — are extraneous to the analysis.

The significance of spatial diversity in the vote dilution context was first illustrated by the 1973 case of *White v. Regester*.[125] Hispanics in San Antonio argued that a countywide multimember district should be replaced by multiple single-member districts, in some of which they would constitute the majority. The Court agreed, and dismantled the multimember district, in large part because it viewed the Hispanics as a geographically defined group with many interests in common. With regard to location, the Court noted that "[t]he bulk of the Mexican-American community . . . occupied the Barrio, an area consisting of about 28 contiguous census tracts."[126] With respect to shared interests, the Court observed that "[t]he Barrio is an area of poor housing" whose "residents have low income and a high rate of unemployment" and "suffer[] a cultural and language barrier."[127] It was precisely because of this high spatial uniformity (in combination with a long history of discrimination) that the San Antonio Hispanics prevailed on their constitutional challenge.[128]

After Congress revised the VRA in 1982 to make it easier to bring statutory vote dilution claims, the Court held that the amended statute also requires something akin to spatial homogeneity on the part of minority plaintiffs. "First, the minority group must be able to demonstrate that it is . . . geographically compact," the Court announced in its landmark 1986 decision, *Thornburg v. Gingles*, and "[s]econd, the minority group must be able to show that it is politically cohesive."[129] Underlying both the compactness and cohesiveness requirements was

124 T. Alexander Aleinikoff & Samuel Issacharoff, *Race and Redistricting: Drawing Constitutional Lines After* Shaw v. Reno, 92 MICH. L. REV. 588, 601 (1993).

125 412 U.S. 755 (1973).

126 *Id.* at 768; *see also id.* at 767–68 (observing that the "Mexican-American community . . . is concentrated for the most part on the west side of the city of San Antonio").

127 *Id.* at 768.

128 *See id.* at 767–70 (discussing history of discrimination against Hispanics in San Antonio area); *see also* Rogers v. Lodge, 458 U.S. 613, 626–28 (1982) (ruling in favor of constitutional vote dilution claim brought by spatially homogeneous African American community in rural Georgia).

129 478 U.S. 30, 50–51 (1986); *see also id.* at 49 (requiring a "politically cohesive, geographically insular minority group"); *id.* at 50 (stating that risk of vote dilution is higher when "electoral minority is homogeneous and insular" (quoting City of Mobile v. Bolden, 446 U.S. 55, 105 n.3 (1980) (Marshall, J., dissenting))); *id.* at 51 (noting that "distinctive minority group interests" must exist before a group can prevail).

I should note that the *Gingles* prongs *themselves* do not amount to a spatial homogeneity requirement; rather, it is the other key language in *Gingles*, as well as the Court's gloss on the prongs in subsequent decisions (particularly *LULAC*), that have effectively created such a requirement. I should also note that spatial homogeneity is not the *only* element that plaintiffs must establish in order to prevail on a vote dilution claim. The third prong of *Gingles* (i.e., racial polarization) and its totality-of-the-circumstances inquiry are both largely unrelated to the geographic variation of the minority population.

the Court's view that the prototypical vote dilution claimants are "members of geographically insular racial and ethnic groups" who "share socioeconomic characteristics, such as income level, employment status, amount of education, housing and other living conditions, religion, language, and so forth."[130] It is these sorts of spatially homogeneous groups whose votes can be diluted most easily by cleverly drawn lines. Under the American system of geographic districting, it is also these groups that have among the most compelling normative claims to constituencies in which they can elect the representatives of their choice.[131]

In the decade after *Gingles*, the Court both denied relief to spatially varied minority populations and held that districts containing such populations could not remedy any alleged vote dilution. In a 1993 case, the Court concluded that "distinct ethnic and language minority groups" in the Minneapolis area were not politically cohesive.[132] An "agglomerated political bloc," whose members lacked both shared interests and geographic proximity, simply was not entitled to its own district under the VRA.[133] Similarly, in a pair of 1996 cases, the Court determined that neither a North Carolina district that merged disparate African American groups,[134] nor a Texas district that "reache[d] out to grab small and apparently isolated minority communities,"[135] could cure potential section 2 violations. The remedial side of section 2, like its test for liability, had no place for spatially heterogeneous minority populations.[136]

These themes were brought into even sharper relief by the Court's recent decision in *LULAC* (most of which dealt with vote dilution rather than political gerrymandering). The Court first held that Hispanics along Texas's border with Mexico were spatially homogeneous. "[T]he Latino population . . . is, for the most part, in close[] geographic proximity," and "[m]ore importantly, there has been no contention that different pockets of the Latino population . . . have divergent needs and interests."[137] These Hispanics were therefore entitled to a district in which they could elect the representative of their choice; and it was

[130] *Id.* at 64 (plurality opinion); *see also id.* ("Where such characteristics are shared, race or ethnic group . . . functions as a shorthand notation for common social and economic characteristics.").

[131] *See id.* at 50 n.17 (majority opinion) (noting that "if the minority group is spread evenly" throughout an area, then it cannot prevail on a vote dilution claim).

[132] Growe v. Emison, 507 U.S. 25, 41 (1993).

[133] *Id.*

[134] *See* Shaw v. Hunt (*Shaw II*), 517 U.S. 899, 916 (1996).

[135] Bush v. Vera, 517 U.S. 952, 979 (1996) (plurality opinion).

[136] *See id.* ("[District 30] could not possibly form part of a [remedial] district."); *Shaw II*, 517 U.S. at 916 ("District 12 could not remedy any potential § 2 violation.").

[137] *LULAC*, 548 U.S. 399, 435 (2006).

unlawful vote dilution when the majority-minority district in which they previously had been placed — Texas's old Twenty-Third — was dismantled.[138]

The Court then emphatically rejected the unusual constituency that the state proposed in an effort to cure the violation. This district — the new Twenty-Fifth — was "a long, narrow strip that wind[ed] its way from McAllen and the Mexican-border towns in the south to Austin, in the center of the State and 300 miles away."[139] Hispanics lived primarily on opposite ends of the district, and possessed "divergent needs and interests owing to differences in socio-economic status, education, employment, health, and other characteristics."[140] In the Court's view, this sort of district was unacceptable as a section 2 remedy. "[T]here is no basis to believe a district that combines two farflung segments of a racial group with disparate interests provides the opportunity that § 2 requires . . . ."[141] The geographic variation of the district's Hispanic voters hampered them from mobilizing politically[142] and from receiving "adequate and responsive representation,"[143] and rendered the district void for section 2 remedial purposes.

Other scholars have also noticed the *LULAC* Court's preference for "culturally compact"[144] and "naturally arising"[145] majority-minority districts. However, they have perceived this preference as something new — an unexpected revision to a body of well-established doctrine.[146] My claim, in contrast, is that spatial diversity has played a vital role in vote dilution cases ever since they first appeared on the Court's docket in the 1970s. *LULAC* may be the Court's most detailed

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[138] *See id.* at 427–29 (analyzing *Gingles* factors and concluding that they were satisfied); *see also id.* at 435 (arguing that Hispanics along Mexican border were "cohesive" and "had found an efficacious political identity").

[139] *Id.* at 424.

[140] *Id.* (citations omitted) (internal quotation marks omitted); *see also id.* at 432 ("[T]here was a 300-mile gap between the Latino communities in District 25, and a similarly large gap between the needs and interests of the two groups."); *id.* at 434 (noting the "different characteristics, needs, and interests of the Latino community near the Mexican border and the one in and around Austin").

[141] *Id.* at 433.

[142] *See id.* at 434 (arguing that district's configuration "could make it more difficult for the constituents in the Rio Grande Valley to control election outcomes" (quoting Session v. Perry, 298 F. Supp. 2d 451, 503 (E.D. Tex. 2004) (per curiam)) (internal quotation mark omitted)).

[143] *Id.* (quoting *Session*, 298 F. Supp. 2d at 502).

[144] *See* Daniel R. Ortiz, *Cultural Compactness*, 105 MICH. L. REV. FIRST IMPRESSIONS 48, 50 (2006).

[145] *See* Richard H. Pildes, *The Decline of Legally Mandated Minority Representation*, 68 OHIO ST. L.J. 1139, 1144–46, 1159 (2007).

[146] *See* Ortiz, *supra* note 144, at 48 ("In an unexpected turn, the Court adopted a new requirement — cultural compactness — under Section 2 of the Voting Rights Act."); Pildes, *supra* note 145, at 1143 (discussing the "dramatic new principle" that emerged in *LULAC*).

disquisition on geography and homogeneity, but it is the culmination, not the start, of a trend.

C. Racial Gerrymandering

The role of spatial diversity in the Court's vote dilution case law is closely related to its function in the field of racial gerrymandering. In the former context, minority populations that are spatially heterogeneous have no legal entitlement to districts in which they can elect the representatives of their choice. In the latter, districts that contain such populations are constitutionally suspect. In the Court's view, when minority voters who vary geographically in key respects are placed in the same districts, those districts are likely to be unlawful racial gerrymanders. It is typically the prohibited criterion of race that accounts for the fusion of otherwise dissimilar minority members.[147]

The Court's skepticism of districts that include spatially varied minority populations has been apparent since its first racial gerrymandering decision. In the 1993 case of *Shaw v. Reno* (*Shaw I*), a majority-black North Carolina district slithered "in snakelike fashion through tobacco country, financial centers, and manufacturing areas," "gobbl[ing] . . . enclaves of black neighborhoods" in each of these disparate regions.[148] The high spatial heterogeneity of the district's black voters made the Court deeply uneasy, because it suggested that race had taken priority over all other districting considerations. As the Court put it, "[a] reapportionment plan that includes in one district individuals who belong to the same race, but who are otherwise widely separated by geographical and political boundaries . . . bears an uncomfortable resemblance to political apartheid."[149] Accordingly, the Court recognized a new cause of action for racial gerrymandering in *Shaw I*, and then struck down the offending district in the case's 1996 sequel.[150]

Spatial diversity played an even more prominent role in the 1995 case of *Miller v. Johnson*.[151] A majority-black Georgia district "connect[ed] the black neighborhoods of metropolitan Atlanta and the poor

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[147] In particular, the Court's governing standard in this area asks whether "race was the predominant factor motivating the legislature's decision to place a significant number of voters within or without a particular district." Miller v. Johnson, 515 U.S. 900, 916 (1995).

[148] 509 U.S. 630, 635–36 (1993) (quoting Shaw v. Barr, 808 F. Supp. 461, 476 (E.D.N.C. 1992) (Voorhees, C.J., concurring in part and dissenting in part)) (internal quotation mark omitted).

[149] *Id.* at 647. On the other hand, the Court commented that districts that contain spatially *homogeneous* minority populations are much less objectionable. "[W]hen members of a racial group live together in one community, a reapportionment plan that concentrates members of the group in one district and excludes them from others may reflect wholly legitimate purposes." *Id.* at 646.

[150] *See Shaw II*, 517 U.S. 899, 901–02 (1996).

[151] 515 U.S. 900 (1995).

black populace of coastal Chatham County," even though they were "260 miles apart in distance and worlds apart in culture."[152] The district's different regions had "absolutely nothing to do with each other,"[153] and its black residents exhibited "fractured political, social, and economic interests."[154] Again, the high spatial heterogeneity of the minority population signaled to the Court that race had been the predominant motive for the district's creation. The district could not have been woven around "some common thread of relevant interests" because no such thread tied the district's voters together.[155] Similarly, the district could not be rescued by "mere recitation of purported communities of interest"[156] because there were "no tangible communities . . . spanning the hundreds of miles of the Eleventh District."[157] The black population's geographic variation helped rule out every explanation but race for the district's design.[158]

Conversely, in the Court's more recent decisions, it repeatedly has upheld districts that contained spatially homogeneous minority voters. Since these voters *did* have attributes in common beyond their racial identity, race was not the obvious reason why they were assigned to the same districts. In the 1997 case of *Lawyer v. Department of Justice*,[159] for instance, the Court affirmed the constitutionality of a Tampa-area district that "comprise[d] a predominantly urban, low-income population . . . whose white and black members alike share a similarly depressed economic condition and interests that reflect it."[160] The minority residents were united not only by their race but also by their residential situation and socioeconomic status, and the district was therefore lawful.

In 1999 and 2001, analogously, the Court twice upheld a revised version of the North Carolina district that it previously had invalidat-

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[152] *Id.* at 908.

[153] *Id.* (quoting Johnson v. Miller, 864 F. Supp. 1354, 1389 (S.D. Ga. 1994)).

[154] *Id.* at 919; *see also id.* at 908 ("[T]he social, political, and economic makeup of the Eleventh District tells a tale of disparity, not community."); *id.* at 909 ("Geographically, [the district] is a monstrosity, stretching from Atlanta to Savannah. Its core is the plantation country in the center of the state, lightly populated, but heavily black. It links by narrow corridors the black neighborhoods in Augusta, Savannah and southern DeKalb County." (quoting MICHAEL BARONE & GRANT UJIFUSA, THE ALMANAC OF AMERICAN POLITICS 1994, at 356 (1993)) (internal quotation marks omitted)).

[155] *Id.* at 920.

[156] *Id.* at 919.

[157] *Id.* (quoting *Johnson*, 864 F. Supp. at 1389–90) (internal quotation marks omitted); *see also id.* at 919–20 ("It is apparent that it was not alleged shared interests but rather the object of maximizing the district's black population . . . that in fact explained the General Assembly's actions.").

[158] *See also* Bush v. Vera, 517 U.S. 952, 965, 979 (1996) (plurality opinion) (striking down Dallas-area district that combined dissimilar African American communities).

[159] 521 U.S. 567 (1997).

[160] *Id.* at 581 (citation omitted); *see also id.* ("[T]he residents of District 21 regard themselves as a community." (internal quotation mark omitted)).

ed in 1996.[161] The district had been amended so that it no longer combined black voters across "tobacco country, financial centers, and manufacturing areas."[162] Instead, the district now "joined three major cities in a manner . . . reflecting 'a real commonality of urban interests, [such as] inner city schools, urban health care [and] public housing.'"[163] The higher spatial uniformity of the minority population (as well as boundaries that reflected partisan rather than racial motivations[164]) helped ensure a different fate for this district than for its predecessor. Race alone could not have been the overriding explanation for a district that brought together urban voters throughout the Piedmont with many needs and interests in common.

Spatial diversity thus provides a useful heuristic for assessing both the statutory necessity and the constitutionality of districts with large minority populations. If these populations are spatially homogeneous, then the districts that contain them are likely required by the VRA and legitimate under the Constitution. On the other hand, if the populations vary geographically along key dimensions, then they need not be placed in the same districts under the VRA — and if they *are* so placed, the Equal Protection Clause may well be violated. Jurisdictions should not succumb to "schizophrenic second-guessing,"[165] then, as they seek to fulfill their statutory and constitutional obligations. Instead, they should ask how spatially heterogeneous the minority voters are whom they are considering assigning to the same districts. The legal implications of the assignments will flow, in large part, from the answers to this question.

III. EMPIRICAL APPLICATIONS

But how can jurisdictions *tell* how spatially heterogeneous the minority voters are? Analogously, in the political gerrymandering context, how can jurisdictions *tell* whether whole districts are or are not spatially diverse? The purposes of this Part are first to introduce a quantitative tool for assessing the geographic variation of both whole districts and minority populations, and then to use this tool to make a series of empirical and doctrinal contributions.[166] I do not mean to

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[161] *See* Easley v. Cromartie, 532 U.S. 234, 237 (2001); Hunt v. Cromartie, 526 U.S. 541, 543, 546 (1999).

[162] Shaw v. Reno, 509 U.S. 630, 635 (1993).

[163] *Easley*, 532 U.S. at 250 (quoting statement of State Senator Leslie Winner); *see also Hunt*, 526 U.S. at 544 (describing the updated district).

[164] To be sure, the Court's focus in *Easley* was on the partisan motivations that explained the district's boundaries, not on the higher spatial uniformity of the district's minority population. *See Easley*, 532 U.S. at 243–44.

[165] Bush v. Vera, 517 U.S. 952, 1037 (1996) (Stevens, J., dissenting).

[166] The only similar effort of which I am aware is a 2001 white paper that used principal components analysis and clustering analysis to identify communities of interest in New York, on the

suggest that this sort of analysis is required by any of the Court's case law. But I do think that it can provide the data-driven rigor that qualitative inquiry sometimes lacks.

I begin by explaining my methodology for calculating spatial diversity. I obtained all of my data from the American Community Survey, and manipulated the data using a technique known as factor analysis. I then investigate whether participation and representation are impaired in spatially diverse districts (as some Justices and scholars claim). I find that they are. Next, I use my spatial diversity scores to make some headway in the long-running debate over political gerrymandering. I identify (and map) egregious districts and statewide plans, evaluate a number of the Court's assertions in *Vieth*, and confirm that spatial diversity is linked to partisan bias and electoral responsiveness. Finally, I use my scores to assess the status of districts with large minority populations under both the VRA and the Equal Protection Clause. I identify (and again map) districts that may be vulnerable to legal challenge, and I appraise some of the Court's pronouncements in *LULAC*.

A. Methodology

My main methodological aim was to quantify the variation of the spatial subunits that make up electoral districts, with respect to the factors that best reflect Americans' residential patterns. In this Article's terminology, districts are spatially diverse when their subunits are heterogeneous in terms of these factors, and spatially non-diverse when their subunits are homogeneous. This definition is a practical analogue to the more theoretical conception of spatial diversity that I outlined above.[167]

I obtained all of the raw data for my project from the American Community Survey (ACS), an ongoing poll of the American public that is conducted by the Census Bureau.[168] Until recently, ACS data had been available only for relatively large geographic units such as states, counties, and towns. In December 2010, however, the ACS released an

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basis of which state senate districts could be drawn. This paper did not consider any other states, nor did it attempt to assess districts' actual heterogeneity. *See* Todd Breitbart et al., Mapping Communities of Interest: The Revised Plaintiffs' Senate Plan (2002) (on file with the Harvard Law School Library).

[167] *See supra* pp. 1912–17.

[168] *See About the American Community Survey*, U.S. CENSUS BUREAU, http://www.census.gov/acs/www/about_the_survey/american_community_survey/ (last visited May 3, 2012); *see also* Michael P. McDonald, *Redistricting Developments of the Last Decade — And What's on the Table in This One*, 10 ELECTION L.J. 313, 316 (2011) (noting that ACS data "may be useful to establish communities of interest where this is a state requirement").

enormous amount of information for Census tracts,[169] which have about 4,000 people each and are designed to be "as homogeneous as possible with respect to population characteristics, economic status, and living conditions."[170] Because of their small size and internal homogeneity, tracts are the most common units of analysis for social scientists who study the U.S. population.[171] These same characteristics make them ideal for my investigation of districts' spatial diversity.[172]

I next selected a wide array of ACS variables (almost a hundred in total) that both researchers[173] and the Supreme Court[174] have identified as relevant to the residential patterns of modern American life. These variables are listed in the Appendix, and fit mostly into the following categories: race, ethnicity, age, income, education, profession, marital status, and housing.[175] Because the new ACS data is more de-

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169 *See 2009 Data Release*, U.S. CENSUS BUREAU, http://www.census.gov/acs/www/data_documentation/2009_release/ (last visited May 3, 2012). The data covers the five-year period from 2005 through 2009. *Id.*

170 U.S. CENSUS BUREAU, GEOGRAPHIC AREAS REFERENCE MANUAL 10-1 (1994), *available at* http://www.census.gov/geo/www/garm.html.

171 *See, e.g.*, Alan Berube & Benjamin Forman, *Patchwork Cities: Patterns of Urban Population Growth in the 1990s*, *in* 1 REDEFINING URBAN AND SUBURBAN AMERICA, *supra* note 36, at 75, 77; Barrett A. Lee et al., *Beyond the Census Tract: Patterns and Determinants of Racial Segregation at Multiple Geographic Scales*, 73 AM. SOC. REV. 766, 767 (2008); Ming Wen et al., *Ethnic Neighborhoods in Multi-Ethnic America, 1990–2000: Resurgent Ethnicity in the Ethnoburbs?*, 88 SOC. FORCES 425, 426–27 (2009). All of these studies relied on Census tract data drawn from the (more limited) Census long form, not from the ACS survey.

172 The Census tract is also an attractive unit of analysis because it is neither so small that most variation is expressed *among* tracts, nor so large that most variation is expressed *within* tracts. *See* Wong, *supra* note 32, at 131 (finding that segregation at tract level in Connecticut is higher than at township level but lower than at block group level).

173 *See, e.g.*, DANTE CHINNI & JAMES GIMPEL, OUR PATCHWORK NATION 222–23 (2010) (using similar variables in study of all U.S. counties); Bernadette Hanlon, *A Typology of Inner-Ring Suburbs: Class, Race, and Ethnicity in U.S. Suburbia*, 8 CITY & COMMUNITY 221, 225–26 (2009) (same in study of inner-ring suburbs); Thomas J. Vicino et al., *Megalopolis 50 Years On: The Transformation of a City Region*, 31 INT'L J. URB. & REGIONAL RES. 344, 352–53 (2007) (same in study of Northeast urban corridor); Breitbart et al., *supra* note 166, at 1–3 (same in study of New York geographic communities). It would be ideal to include attitudinal data in the analysis as well. Unfortunately, there are no national opinion surveys large enough to generate reliable figures all the way down to the Census tract level. In a sequel to this Article, however, I incorporate voting results from California's popular initiatives — which *are* available for tracts — into my spatial diversity calculations for the state. *See generally* Nicholas O. Stephanopoulos, *Communities and the Commission*, 23 STAN. L. & POL'Y REV. (forthcoming 2012); *see also* Makse, *supra* note 77, at 1–2 (using Ohio initiative data to draw districts).

174 *See LULAC*, 548 U.S. 399, 424 (2006) (noting as relevant, in vote dilution context, "differences in socio-economic status, education, employment, health, and other characteristics" (quoting Session v. Perry, 298 F. Supp. 2d 451, 512 (E.D. Tex. 2004)) (internal quotation marks omitted)); Thornburgh v. Gingles, 478 U.S. 30, 64 (1986) (plurality opinion) (discussing importance, also in vote dilution context, of "share[d] socioeconomic characteristics, such as income level, employment status, amount of education, housing and other living conditions, religion, language, and so forth").

175 *See infra* app. tbl.1.

tailed than the information that formerly was provided by the Census long form, my set of variables is more comprehensive than any that I have found in the literature. However, as long as all key areas are covered, it appears that the precise choice of variables in this sort of study is relatively unimportant.[176]

After I obtained the ACS data at the tract level for all of my chosen variables, I carried out a statistical procedure known as factor analysis. Factor analysis is a commonly used tool for simplifying and rendering intelligible large volumes of data.[177] It collapses many raw variables into a handful of composite factors, all of which are linear functions of the raw variables and are calculated so as to capture as much as possible of the original variance in the data. It is a particularly powerful technique for "disentangl[ing] the sociospatial organization of [residential] space."[178] Depending on whether I examined the nation as a whole or specific states, or entire districts or just their minority populations, the factor analysis condensed the hundred or so raw variables into anywhere from five to eight composite factors. As a group, these factors generally captured more than sixty percent of the data's original variance.[179]

While they are not the focus of my project, the identities of the composite factors — which represent the attributes that best account

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[176] *See* Breitbart et al., *supra* note 166, app. (finding that results of analysis barely changed when twelve new variables were added or when eighteen were dropped). My own experiments with adding and dropping variables also indicate that the precise mix of variables is mostly immaterial.

[177] *See, e.g.*, CHINNI & GIMPEL, *supra* note 173, at 223–25 (carrying out factor analysis in order to identify patterns in U.S. counties); Hanlon, *supra* note 173, at 227 (same to categorize inner-ring suburbs); Joel Lieske, *Regional Subcultures of the United States*, 55 J. POL. 888, 895 (1993) (same to identify U.S. regional subcultures); Thomas J. Vicino, *The Spatial Transformation of First-Tier Suburbs, 1970 to 2000: The Case of Metropolitan Baltimore*, 19 HOUSING POL'Y DEBATE 479, 493–95 (2008) (same to analyze evolution of Baltimore suburbs); Breitbart et al., *supra* note 166, at 4 n.2 (same to map New York communities of interest); Makse, *supra* note 77 (same to draw Ohio districts).

[178] Hanlon, *supra* note 173, at 227; *see also* Vicino, *supra* note 177, at 493 (describing factor analysis as an "important tool in deciphering the spatial organization of urban places").

[179] To be more specific, I employed principal factors analysis with varimax rotation but without Kaiser normalization, and I retained all factors with an eigenvalue greater than two (i.e., all factors that explained more than twice as much of the variance as the original set of variables). I settled on this approach because it yielded the most intelligible composite factors and captured the largest proportion of the data's original variance. However, the results were nearly identical when I experimented with other common approaches (e.g., principal *components* analysis, principal factors analysis *with* Kaiser normalization, and principal factors analysis with *oblique* rotation). *See* Douglas S. Massey et al., *The Dimensions of Segregation Revisited*, 25 SOC. METHODS & RES. 172, 178 (1996) (finding "repeated confirmation of basic findings" after conducting different kinds of factor analysis); Breitbart et al., *supra* note 166, at 4 n.2 (also finding little difference between different factor analytical techniques); *see also* Hanlon, *supra* note 173, at 227 (also using varimax rotation and retaining factors with eigenvalues near to or greater than two); Vicino, *supra* note 177, at 495 (retaining eigenvalues over two).

for contemporary Americans' residential patterns — are extremely interesting. At the national level, the factor with the greatest explanatory power is primarily a function of raw variables relating to income, education, and profession. It distinguishes tracts whose residents are well-educated, wealthy professionals from tracts whose residents have the opposite characteristics. The next most significant factor corresponds largely to marital and residential situation. It differentiates between tracts of married home-owners (mostly suburbs and rural areas) and tracts of unmarried apartment-dwellers (mostly cities). The third, fourth, and fifth factors all revolve around race. They indicate, respectively, the proportions of tracts' populations that are Hispanic, African American, and Asian American. The sixth factor identifies tracts with white ethnic residents living in older housing stock. The seventh factor is mostly a measure of age. Lastly, the eighth factor tells apart tracts with heavily agricultural workforces from tracts whose economies are more service-oriented. These findings are consistent with those of other researchers,[180] and are presented more fully in Table 1 in the Appendix.[181]

After I generated the composite factors, I calculated scores along them for all of the Census tracts in the country. These scores simply show how the tracts perform in terms of the newly created factors.[182] I then determined the standard deviation, with regard to each factor, of the tracts within each congressional district. The Census Bureau provides tables that indicate which tracts are located within which districts.[183] Standard deviation, of course, is the most common statistical measure of heterogeneity.[184] Districts whose tracts are relatively simi-

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[180] *See, e.g.*, Hanlon, *supra* note 173, at 228–31 (identifying similar composite factors in study of inner-ring suburbs); Brian A. Mikelbank, *A Typology of U.S. Suburban Places*, 15 HOUSING POL'Y DEBATE 935, 949–57 (2004) (same in study of suburban places); Vicino et al., *supra* note 173, at 354, 356 (same in study of Census places in Northeast corridor); Elvin K. Wyly, *Continuity and Change in the Restless Urban Landscape*, 75 ECON. GEOGRAPHY 309, 326 (1999) (same in study of Minneapolis metropolitan area).

[181] *See infra* app. tbl.1. All raw variables are displayed in Table 1, while subsequent tables that show the results of factor analyses display only the raw variables with significant loadings (i.e., greater than 0.4 or less than -0.4).

[182] *See, e.g.*, CHINNI & GIMPEL, *supra* note 173, at 223–25 (calculating factor scores for U.S. counties); Vicino, *supra* note 177, at 498 (same for Baltimore suburbs); Makse, *supra* note 77, at 7 (same for Ohio voting precincts).

[183] *See 110th Congressional Districts Geographic Relationship Tables*, U.S. CENSUS BUREAU (Mar. 14, 2007), http://www.census.gov/geo/www/cd110th/tables110.html. While the vast majority of tracts are located entirely within a single district, approximately eight percent of the country's population lives in tracts that are divided among two or more districts. Because tracts are designed to be internally homogeneous, I simply included split tracts in my calculations for *all* of the districts that contain them. But my results were essentially identical when I excluded split tracts altogether from my analysis.

[184] *See, e.g.*, CAMPBELL, *supra* note 26, at 67 (analyzing distribution of ideological preferences using standard deviation); GRONKE, *supra* note 27, at 40 ("Variance is an appropriate measure of

lar, in terms of a particular factor, have a low standard deviation in this respect. Districts whose tracts are relatively dissimilar have a high standard deviation.

Finally, I computed a weighted average of each district's standard deviations for each of the composite factors. The weights that I used, not surprisingly, were the proportions of the data's original variance that the factors each explained. So a district's standard deviation for the first factor (socioeconomic status) counted for more than its standard deviation for the second (urban/suburban location), which in turn counted for more than its standard deviation for the third (Hispanic ethnicity), and so forth down the list. This weighted average is my core metric of spatial diversity. It reveals, with respect to a vast amount of ACS information, the relative heterogeneity of congressional districts' constituent Census tracts.[185]

Two further methodological points are worth noting. First, because it is arithmetically possible for a district's high standard deviation to be the result of a checkerboard tract pattern — rather than the fusion of distinct tract groups — I investigated to what degree the tracts clustered spatially in terms of the various composite factors.[186] As geographers might have predicted,[187] the degree of clustering was extremely high, allowing me to reject the null hypothesis of no spatial autocorrelation for almost every district (and factor) that I examined.[188] This

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dispersion for continuous variables . . . ."); P.J. TAYLOR & R.J. JOHNSTON, GEOGRAPHY OF ELECTIONS 150 (1979); Paul DiMaggio et al., *Have Americans' Social Attitudes Become More Polarized?*, 102 AM. J. SOC. 690, 696 (1996). I calculated *weighted* standard deviations in order to take into account tracts' differing populations. *See* Breitbart et al., *supra* note 166, at 4 (also weighing variables by population). I could not compute meaningful coefficients of variance (i.e., the standard deviation divided by the mean) for my data because the factor scores produced by the analysis all have means of zero.

[185] Not surprisingly, my metric of spatial diversity has only a moderate relationship to measures of districts' *top-line* diversity. *See, e.g.*, Bond, *supra* note 25, at 202 (presenting one such measure); Herrnson & Gimpel, *supra* note 25, at 120–21 (presenting another); *see also supra* note 35 (noting that districts' scores on Sullivan Index explain about sixty percent of variance in their spatial diversity scores).

[186] *See* Lee et al., *supra* note 171, at 770 (noting that most measures of residential segregation cannot distinguish between checkerboard patterns and clustered arrangements); Reardon & O'Sullivan, *supra* note 32, at 123 (same).

[187] *See supra* note 33 and accompanying text (discussing Tobler's First Law).

[188] I measured spatial autocorrelation by calculating the Global Moran's I for a wide range of districts and with respect to all of the composite factors. Global Moran's I is "the most commonly employed method of assessing the significance and/or degree of spatial autocorrelation in the data." Wendy K. Tam Cho, *Contagion Effects and Ethnic Contribution Networks*, 47 AM. J. POL. SCI. 368, 372 (2003); *see also* Su-Yeul Chung & Lawrence A. Brown, *Racial/Ethnic Residential Sorting in Spatial Context: Testing the Explanatory Frameworks*, 28 URB. GEO. 312, 322 (2007) (using Global Moran's I to evaluate spatial clustering of racial groups in the Columbus, Ohio, metropolitan area); Jowei Chen & Jonathan Rodden, Using Legislative Districting Simulations to Measure Electoral Bias in Legislatures 8–11 (July 15, 2010) (unpublished manuscript), *available at* http://www-personal.umich.edu/~jowei/florida.pdf (same for spatial clustering of Democratic and

means that a district's high standard deviation indeed indicates that it combines different spatial clusters of tracts, not that its tracts merely happen to be arranged in the form of a checkerboard.

Second, while my primary factor analysis incorporated *all* of the Census tracts in the country for which data was available, I also carried out more focused factor analyses for (1) tracts in individual states and (2) tracts with large minority populations. The analyses of individual states provided greater accuracy as to the composite factors that matter most for those particular jurisdictions.[189] Similarly, the analyses of minority-heavy tracts allowed me to identify the factors that best explain the residential arrangements of specific minority groups. The different analyses did not produce very different statistical results, but, as discussed below, they do have somewhat different legal applications.

B. Participation and Representation

At the outset, I employ my spatial diversity scores to evaluate some of the objections, sounding in democratic theory, that Supreme Court Justices (and scholars) have voiced with respect to geographically varied constituencies. As noted earlier, several Justices have worried that voters are confused and demoralized by districts that merge disparate geographic groups, and that elected officials from such districts are less able to identify and advance their constituents' interests.[190] The available literature lends credence to the Justices' concerns,[191] but the claim that spatial diversity impedes participation and representation has never been tested directly.[192] In this section, I assess the claim and I find that it is largely correct. The rate of voter roll-off is substantially higher in spatially diverse districts, while the link between politicians' voting records and their constituents' interests is substantially weaker. Representatives from spatially diverse districts also have more polarized voting records than their counterparts from spatially homogeneous districts.

Republican voters in Florida). The Global Moran's I scores that I calculated were almost always positive (indicating spatial autocorrelation) and highly statistically significant.

[189] *See* Breitbart et al., *supra* note 166, at 2 (carrying out separate factor analyses for different New York regions).

[190] *See supra* Part II, pp. 1924–35. These points were made most forcefully by Justice Powell in *Karcher* and *Bandemer*, by Justice Stevens in *Vieth* and *LULAC*, and by Justice Kennedy in *Miller* and *LULAC*. *See id.* Of course, Justices Powell and Stevens are no longer on the Court, meaning that the current Justices may be less receptive to these arguments than were some of their predecessors.

[191] *See supra* section I.C, pp. 1917–24.

[192] *Cf.* Adam B. Cox & Richard T. Holden, *Reconsidering Racial and Partisan Gerrymandering*, 78 U. CHI. L. REV. 553, 584–85 (2011) (observing that scholars have not yet determined whether "the composition of an electoral district influence[s] voters' decisions . . . about whether to go to the polls").

I measured voter participation by determining the share of a House district's voters who cast a ballot for President in 2008 but who did *not* cast a ballot for Congress.[193] The gap between the presidential and congressional turnout rates is known as voter roll-off, and is the preferred metric of participation at the district level. House turnout alone is too crude of a statistic, since "House contests are typically held simultaneously with high-profile presidential, Senate, or gubernatorial contests," and so House "turnout rates are related to a number of factors that have nothing to do with reapportionment."[194] Roll-off, in contrast, zeroes in on the confusion and lack of information that might lead voters to abstain from casting a ballot for Congress after they have already cast a top-ticket vote.[195]

The scatter plot in Figure 3 shows the relationship between spatial diversity and voter roll-off in the 2008 elections. As is evident from the plot, the relationship was quite positive. The higher a House district's spatial diversity, the more likely its voters were to refrain from casting a congressional ballot after they had already cast a presidential ballot. In fact, the roll-off rate in the most spatially diverse districts was approximately *three times* the roll-off rate in the least spatially diverse districts. This is persuasive evidence that geographic variation does in fact have an impact on voter participation. Voters do seem to be less politically engaged (and hence more likely to roll off) in districts whose constituent tracts are highly heterogeneous.[196]

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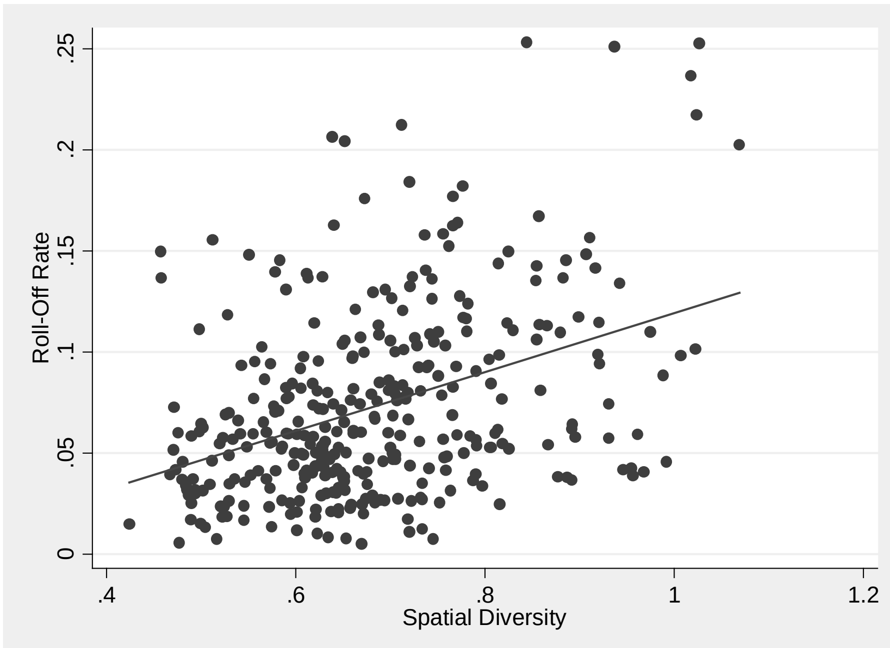
[193] I obtained congressional election results from the Clerk of the House of Representatives, *Statistics of the Presidential and Congressional Elections of November 4, 2008*, OFFICE OF THE CLERK, U.S. HOUSE OF REPRESENTATIVES (July 10, 2009), http://clerk.house.gov/member_info/electioninfo/2008/2008Stat.htm, and presidential election results from *Presidential Results by Congressional District, 2000-2008*, SWING STATE PROJECT (Dec. 12, 2008, 4:10 PM), http://www.swingstateproject.com/diary/4161/. I used two-party congressional turnout figures because they are both more accurate and more relevant to the claim that spatially diverse districts cause voters to become disillusioned with the major parties. I omitted districts in which the 2008 congressional elections were either uncontested or extremely uncompetitive (i.e., one party's candidate received more than ninety percent of the vote) because the voter roll-off in such districts cannot be attributed to spatial diversity. I also omitted Alabama, Illinois, and Massachusetts districts because the presidential election results by district were not reliable for those states. I focused on the 2008 election because it enables an easy comparison between top-ticket (i.e., presidential) and lower-ticket (i.e., congressional) voting patterns.

[194] Danny Hayes & Seth C. McKee, *The Participatory Effects of Redistricting*, 53 AM. J. POL. SCI. 1006, 1009 (2009).

[195] *See id.* (noting that "a wide variety of studies have documented a strong relationship between voter information and roll-off"); *see also* Danny Hayes & Seth C. McKee, *The Intersection of Redistricting, Race, and Participation*, 56 AM. J. POL. SCI. 115, 120 (2012) ("We focus on roll-off, rather than turnout, because it allows us to more closely tie redistricting to House election participation.").

[196] A simple bivariate regression ($t = 7.99$, $P = 0.000$) confirms that spatial diversity is a significant predictor of voter roll-off. All of the regressions that I ran for this Article used ordinary least squares.

FIGURE 3: ROLL-OFF RATE VERSUS SPATIAL DIVERSITY IN 2008 ELECTIONS



Moreover, this result held even after I controlled for other variables that are known to drive voter turnout. Controlling for income, education, age, race, and margin of victory,[197] spatial diversity remained a statistically significant predictor of roll-off rate.[198] With these variables held constant at their means, a House district's shift from the tenth to the ninetieth percentile in spatial diversity was associated with an increase in roll-off rate of about six percentage points. Similarly, the result held even after I controlled for districts' *top-line* diversity. Controlling for districts' scores on the Sullivan Index (incorporating data on race, ethnicity, age, income, education, profession, marital sta-

[197] *See* Juliana Menasce Horowitz, Divided Government and Voter Turnout in Gubernatorial Elections 8 (unpublished manuscript) (on file with the Department of Government and Politics, University of Maryland), *available at* http://www.bsos.umd.edu/gvpt/apworkshop/menasce.pdf (listing variables linked to turnout).

[198] *See infra* app. tbl.2 (showing multivariate regression results; t = 3.14 and P = 0.002 for spatial diversity). Of the individual factors that are included in my aggregate measure of spatial diversity, heterogeneity in terms of African American population, Asian American population, age, and agricultural employment had the greatest impact on voter roll-off.

tus, and housing),[199] spatial diversity again remained a statistically significant predictor of roll-off rate.[200] With the Sullivan Index held constant at its mean, a district's shift from the tenth to the ninetieth percentile in spatial diversity was associated with an increase in roll-off rate of about nine percentage points. These findings help confirm that it is geographic variation itself — and not other factors with which it might correlate — that influences voters' decisions to abstain from casting congressional ballots. The Justices' intuitions about the negative implications of spatially diverse districts for voter participation thus appear to be accurate.

Turning to representation, I examined how well key district attributes explained the voting records of House members from the most spatially diverse and least spatially diverse districts over the last three Congresses. I quantified voting records using the DW-Nominate scores that political scientists Keith Poole and Howard Rosenthal have calculated.[201] These scores indicate how liberal or conservative the votes are that a House member casts in a given session of Congress.[202] I quantified district attributes using the composite factor scores that I computed earlier for all Census tracts.[203] I simply determined the *averages* of these scores, with respect to each factor, for the tracts that lie within each House district.[204] Like the standard deviations, these averages incorporate an enormous amount of demographic and socioeconomic information from the ACS survey.

I then regressed the DW-Nominate scores against the district attributes, first for the fifty most spatially diverse districts in the country

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[199] *See supra* note 25 and accompanying text (discussing Sullivan Index). I included the following eight categories in my computation of districts' Sullivan Index scores: race (white, black, Asian, other); ethnicity (Hispanic, non-Hispanic); age (under 19, 20 to 44, 45 to 64, over 65); household income (under $15,000, $15,000 to $50,000, $50,000 to $150,000, over $150,000); education (less than high school, high school but less than college, college but less than graduate school, graduate school); profession (management, service, sales, agriculture, construction, production); household type (married family, nonfamily, other); and housing status (owner, renter).

[200] *See infra* app. tbl.2 (showing multivariate regression results; $t = 5.59$ and $P = 0.000$ for spatial diversity). As noted earlier, political scientists have obtained similar results when they studied the consequences of top-line diversity for voter turnout. *See supra* note 52 and accompanying text.

[201] *See* Royce Carroll et al., *DW-NOMINATE Scores with Bootstrapped Standard Errors*, VOTEVIEW.COM (Feb. 3, 2011), http://www.voteview.org/dwnominate.asp. I used an average of each district's scores over the last three Congresses (i.e., 2005–2010). For the handful of districts that had more than one representative in a given Congress, I averaged the members' scores. The results for each individual Congress are very similar to the results for the entire six-year period.

[202] *See id.* (noting that in post-1980 period only one dimension is required to capture most of variance in House members' voting patterns).

[203] *See supra* note 182 and accompanying text (discussing calculation of factor scores).

[204] As with the standard deviations, I calculated *weighted* averages in order to take into account tracts' differing populations. *See supra* note 184. The results of my analysis are essentially unchanged if I use districts' median (rather than average) factor scores.

and then for the fifty least spatially diverse.[205] To guard against the possibility that my results were driven by the districts' top-line diversity, I controlled for their scores on the Sullivan Index.[206] As Figure 4 indicates, the district attributes explained about sixteen percent of the voting record variance in the most spatially diverse districts, but about forty-seven percent in the least spatially diverse districts. In other words, the records of House members from highly heterogeneous districts were tied much less tightly to their districts' defining characteristics than were the records of members from highly homogeneous districts. To the extent that these characteristics capture salient political interests, the implication is that representation was less responsive in the highly heterogeneous districts. Elected officials in these districts voted more often in ways that were unrelated to (or at least unpredicted by) their constituents' apparent interests.[207]

If the voting records of House members from the most spatially diverse districts did not correspond to their districts' key attributes, to what *did* they correspond? The answer, put simply, is partisanship. Again controlling for top-line diversity, I regressed the DW-Nominate scores against districts' Cook PVI scores,[208] which measure their partisan leaning relative to the nation as a whole.[209] As Figure 4 also shows, the Cook PVI scores explained about fifty-six percent of the voting record variance in the most spatially diverse districts, but only about twenty-eight percent in the least spatially diverse districts. A district's underlying partisan orientation was thus a far better predictor of its member's voting record if the district was highly heterogene-

[205] *See infra* app. tbl.3 (showing multivariate regression results); *see also* Bailey & Brady, *supra* note 25, at 537 (using analogous research design). Like political scientists who have conducted similar studies, I included interaction terms in my regressions between the variables of interest and corresponding measures of spatial diversity. *See id.* at 540 n.11; Gerber & Lewis, *supra* note 66, at 1376. However, the results of my analysis are very similar if I omit the interaction terms.

[206] However, this is not a perfect control since the level of top-line diversity still varies *between* (as opposed to *within*) the two samples.

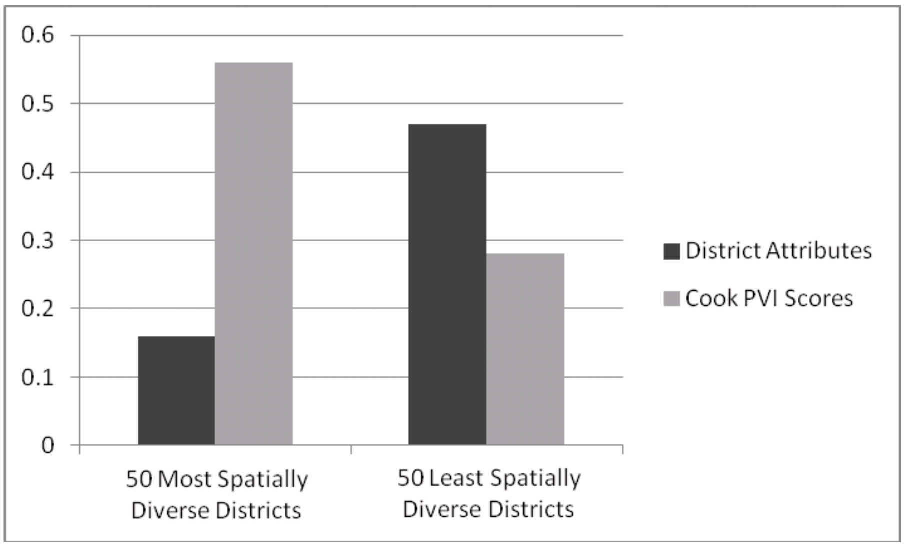
[207] These results are consistent with the findings of political scientists who have investigated the voting records of representatives from top-line diverse and non-diverse constituencies. *See supra* notes 65–66 and accompanying text. Of course, it is only troubling for elected officials to vote in ways not predicted by their constituents' attributes if one subscribes, at least in part, to a delegate model of representation. Under a pure trustee model, it is largely irrelevant how well officials' voting records are tied to their constituents' characteristics. *See generally* PITKIN, *supra* note 60 (describing delegate and trustee models of representation).

[208] *See infra* app. tbl.3 (showing multivariate regression results). I again included an interaction term between Cook PVI and spatial diversity, though again, my results are almost identical if I omit the interaction term. In a separate set of regressions, I used legislators' partisan affiliation as a measure of partisanship. The legislators' party membership explained ninety-one percent of the voting record variance in the most spatially diverse districts, and eighty-eight percent of the variance in the least spatially diverse districts. These results are consistent with (though much less dramatic than) those produced by the Cook PVI analysis.

[209] *See Introducing the Cook Political Report Partisan Voting Index (PVI) for the 111th Congress*, COOK POL. REP. (Apr. 9, 2009), http://cookpolitical.com/node/4201.

ous. If the district was highly homogeneous, then partisan slant was a much less significant factor, and, to reiterate, residents' actual characteristics were much more influential. Once again, the Justices' intuitions about the link between geographic variation and representation seem quite keen. Elected officials from spatially diverse districts are indeed more sensitive to partisan pressures than to the evident interests of their constituents.[210]

FIGURE 4: PROPORTIONS OF VARIANCE EXPLAINED BY REGRESSIONS OF DW-NOMINATE SCORES AGAINST DISTRICT ATTRIBUTES AND COOK PVI SCORES



This analysis of House members' voting records also has intriguing implications for legislative polarization. In recent years, scholars have observed (and bemoaned) a rising gap between the two parties' policy positions. As Professor Richard Pildes puts it, "[w]e have not seen . . . the radical separation between the two major political parties that characterizes our age since the late nineteenth century."[211] But since representatives from highly spatially homogeneous districts tend to vote more often in ways not predicted by their districts' partisan

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[210] Again, these results are consistent with the findings of political scientists who have studied elected officials' responsiveness to partisan pressures in top-line diverse and non-diverse constituencies. *See supra* note 67 and accompanying text.

[211] Richard H. Pildes, *Why the Center Does Not Hold: The Causes of Hyperpolarized Democracy in America*, 99 CALIF. L. REV. 273, 276 (2011); *see also, e.g.*, ALAN I. ABRAMOWITZ, THE DISAPPEARING CENTER 139–57 (2010); NOLAN MCCARTY ET AL., POLARIZED AMERICA 15–70 (2006).

orientations, we might expect their voting records to be somewhat less polarized. Conversely, we might expect representatives from highly spatially diverse districts, whose votes are predicted much better by their districts' underlying partisanship, to have particularly polarized records.

To evaluate these hypotheses, I created histograms of House members' DW-Nominate scores for both the hundred most spatially diverse districts in the country and the hundred least spatially diverse.[212] These histograms, displayed below as Figures 5 and 6, reveal that polarization is in fact higher among representatives from very spatially diverse districts than among representatives from very spatially homogeneous districts.[213] The histogram for the very spatially diverse districts features two distinct clusters: a larger one on the far left (reflecting liberal voting records) and a smaller one on the far right (reflecting conservative records). The center of the distribution is essentially empty. In contrast, the histogram for the very spatially homogeneous districts is not as conspicuously bimodal, and its liberal and conservative peaks are less pronounced and somewhat closer to the middle. More importantly, the center of this distribution is *not* empty, but rather includes a fair number of representatives with more moderate voting records.[214]

These results suggest that spatial homogeneity may be linked not only to higher voter participation and more effective representation, but also to lower legislative polarization. Precisely because House members from highly spatially homogeneous districts are more responsive to their constituents' actual characteristics, and less driven by their districts' partisan orientations, their voting records seem to be substantially less polarized. The creation of more spatially homogeneous constituencies may therefore be a plausible mechanism for ameliorating the "partisan warfare" and "hyperpolarized politics" that typify the contemporary Congress.[215]

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[212] I considered the hundred most and least spatially diverse districts in the country, rather than the fifty, simply in order to obtain more data for the histograms. The results are almost identical if smaller numbers of districts are taken into account.

[213] Arithmetically, the gap between the respective DW-Nominate averages for the two parties is 1.05 for the hundred most spatially diverse districts and 0.77 for the hundred least spatially diverse districts. *See infra* figs.5 & 6.

[214] Some of the voting records in the center of the distribution are attributable to my averaging DW-Nominate scores over three Congresses. *See supra* note 201. The histograms for very spatially homogeneous districts for each individual Congress reveal somewhat greater polarization — though still significantly less than do the histograms for very spatially diverse districts. Once again, these results are consistent with those of political scientists. *See* sources cited *supra* note 67.

[215] Pildes, *supra* note 211, at 277, 281.

FIGURE 5: HISTOGRAM OF DW-NOMINATE SCORES FOR HUNDRED MOST SPATIALLY DIVERSE DISTRICTS

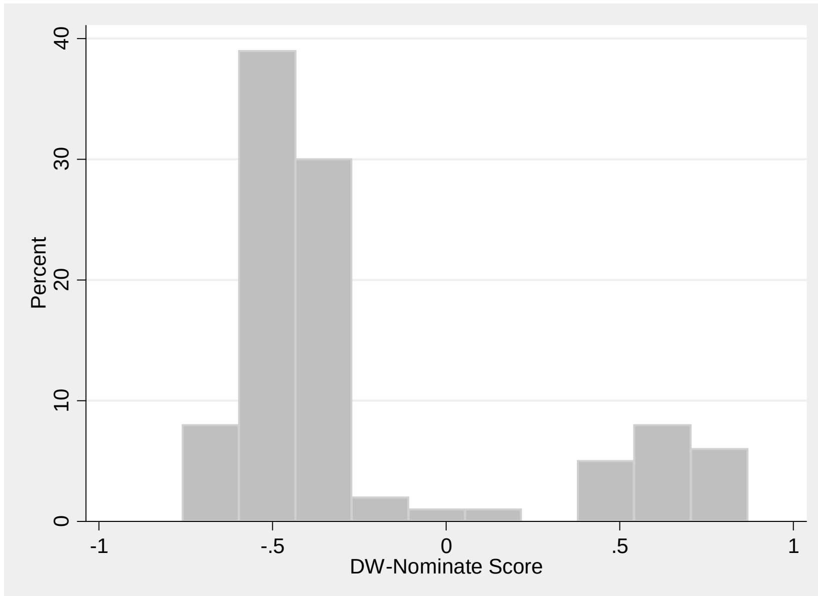
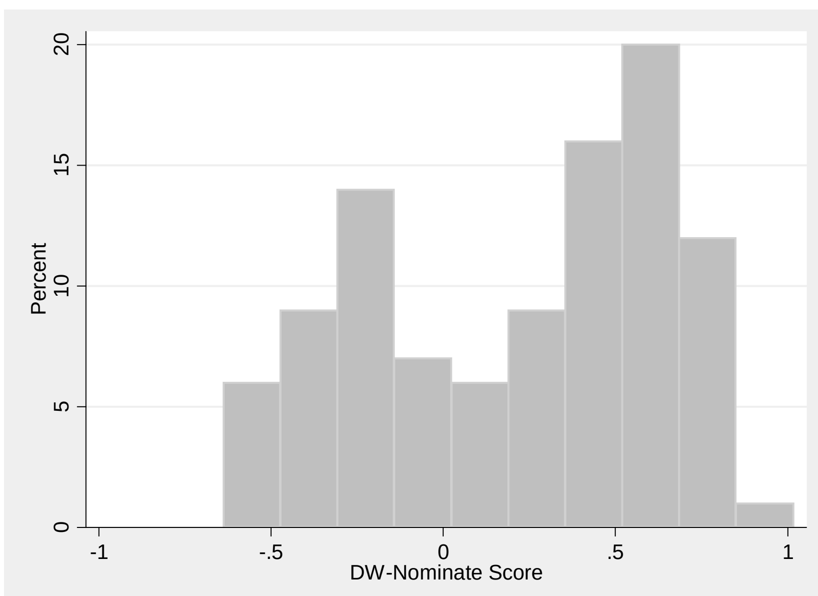


FIGURE 6: HISTOGRAM OF DW-NOMINATE SCORES FOR HUNDRED LEAST SPATIALLY DIVERSE DISTRICTS



C. Political Gerrymandering

While their repercussions for participation and representation are important, this Article focuses on the *legal* consequences of spatially diverse districts. I therefore turn now to the seemingly intractable debate over political gerrymandering. I first show how spatial diversity scores can be used to identify egregious districts and statewide plans. I then revisit the Supreme Court's decision in *Vieth*, armed this time with scores for both Pennsylvania's individual districts and the state as a whole. Lastly, I confirm that spatial diversity is related to common measures of gerrymandering such as partisan bias and electoral responsiveness.

1. Identifying Gerrymanders. — Districts' spatial diversity scores have at least two potential doctrinal applications. First, they may be persuasive evidence of political gerrymandering for some Justices. As discussed above, several members of the Court have stated over the years that they would have invalidated districts that were highly spatially heterogeneous, and the full Court has never rejected this approach.[216] Future plaintiffs in gerrymandering cases would thus be well advised to present statistical proof that the districts (or plans) they are challenging are particularly geographically varied. Second, because spatially diverse districts tend to merge disparate communities, the scores are relevant to whether state community-of-interest provisions have been followed. These provisions exist in about half the states, are aimed at preventing line-drawing abuses, and typically require districts to correspond, where possible, to geographic communities of interest.[217] High spatial diversity scores send a clear signal that the provisions may have been violated.

That the scores can be calculated in the first place is also significant. The explanation the Court has given for its refusal to adopt a political gerrymandering standard is that all of the standards it has

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[216] *See supra* section II.A, pp. 1925–28.

[217] *See supra* note 122; *see also* Stephanopoulos, *supra* note 173 (using spatial diversity scores to analyze California districts' congruence with geographic communities). Of course, spatial diversity is only a *proxy* for the failure to respect communities of interest. It is possible (though not very likely) that objectively dissimilar groups of people nevertheless think of themselves subjectively as a unified community. Analogously, it is possible (though again unlikely) that objectively similar groups of people feel subjectively that they belong to different communities. However, even if spatial diversity is an imperfect proxy for community disruption, it is clearly superior to the usual approach: simply counting the numbers of towns and counties that a given district plan splits. *See* BRUNELL, *supra* note 60, at 66–67 (summarizing the standard approach); *see also* John C. Courtney, *From Gerrymanders to Independence: District Boundary Readjustments in Canada*, *in* REDISTRICTING IN COMPARATIVE PERSPECTIVE 11, 17–18 (Lisa Handley & Bernard Grofman eds., 2008) (explaining that in Quebec the socioeconomic homogeneity of electoral precincts is used to assess how well district plans respect communities of interest).

been offered are judicially unmanageable.[218] But few tasks would be more manageable for the courts than striking down — or at least treating as suspect — districts whose geographic variation exceeds a certain quantitative threshold. Another data-intensive test, requiring the determination of districts' deviations from the ideal population size, is precisely how the Court enforces its one-person, one-vote rule.[219] So if the Court were persuaded that spatial diversity captures appropriate constitutional values, there is little doubt that the concept could be converted into a workable judicial standard.

Table 4 in the Appendix, then, lists selected congressional districts in order from highest to lowest spatial diversity.[220] More specifically, the table includes the fifty most spatially diverse districts in the country, the fifty least spatially diverse, and the districts that rate highest and lowest with respect to each individual composite factor. Similarly, Figure 7 shows the distribution of spatial diversity scores for all districts. The distribution appears log-normal, with a noticeable tail on the right that contains a number of districts that are especially heterogeneous. These are the districts that might be most vulnerable to political gerrymandering or state community-of-interest challenges. Interestingly, there are essentially no outliers in the opposite direction, perhaps because America's underlying political geography makes it very difficult to draw *exceptionally* homogeneous districts (at least at the congressional level).

As is evident from Table 4 (and reflected in the histogram's respective edges), Illinois's Seventh District is the most spatially diverse district in the country, while Pennsylvania's Ninth is the least spatially diverse. At a qualitative level, these rankings are not particularly surprising. Illinois's Seventh District combines Chicago's prosperous Gold Coast and Magnificent Mile with the poor and heavily black West Side as well as varied suburbs such as Oak Park, River Forest, and Maywood.[221] In contrast, Pennsylvania's Ninth District consists mostly of small, low-income, and racially homogeneous towns in the rural south-central section of the state.[222]

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[218] *See LULAC*, 548 U.S. 399, 416–23 (2006) (opinion of Kennedy, J.); Vieth v. Jubelirer, 541 U.S. 267, 281–301 (2004) (plurality opinion).

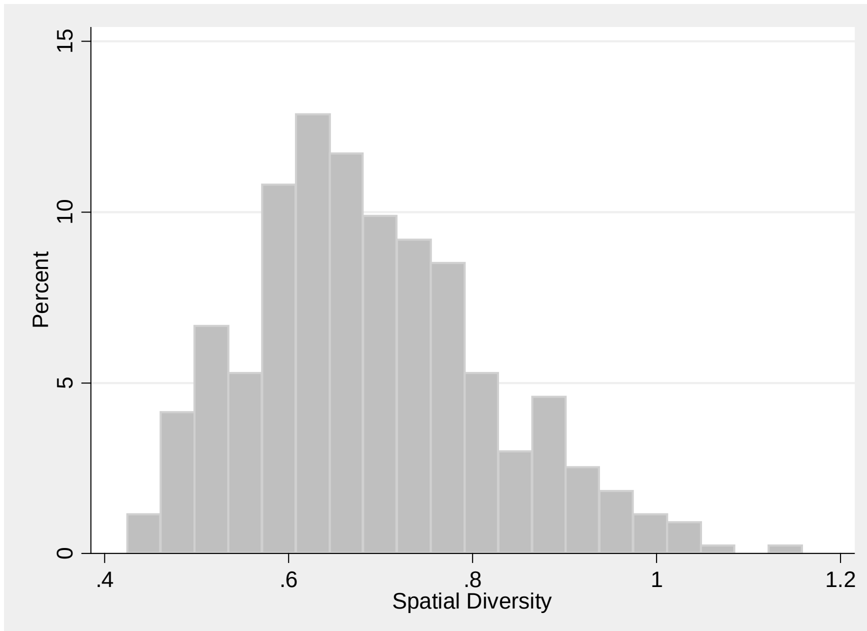
[219] Similarly, the Court's vote-dilution case law requires racial polarization in voting to be calculated, *see* Thornburg v. Gingles, 478 U.S. 30, 55–58 (1986), and the VRA's preclearance provision focuses on the number of districts in covered states in which minority groups can successfully elect the representatives of their choice, *see* 42 U.S.C. § 1973c (2006). Complex quantitative analysis cannot be avoided in the election law domain.

[220] *See infra* app. tbl.4. I did not include all 435 districts simply because the full list (which is on file with the Harvard Law School Library) is somewhat unwieldy.

[221] *See Illinois 7th District: Chicago; Downtown, West Side*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/il/07 (last visited May 3, 2012).

[222] *See Pennsylvania 9th District: South Central Pennsylvania; Altoona*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/pa/09 (last visited May 3, 2012).

FIGURE 7: HISTOGRAM OF CONGRESSIONAL DISTRICTS' SPATIAL DIVERSITY SCORES



More quantitatively (and spatially), the maps in Figure 8 display the scores, with respect to all eight composite factors, of the Census tracts that constitute each of these districts.[223] The much higher geographic diversity of Illinois's Seventh District is apparent to the naked eye. In terms of the factor for socioeconomic status, for instance, the Seventh includes both areas that score extremely highly (the Gold Coast, the Magnificent Mile, Oak Park, and River Forest) and areas

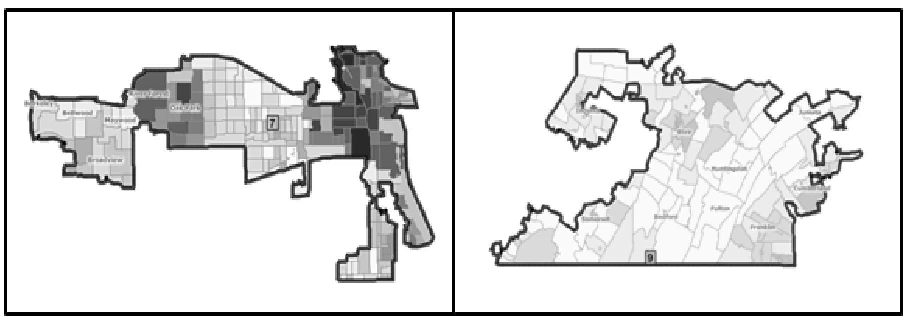
[223] All district maps were created using Caliper Corporation's Maptitude for Redistricting software. Deeper shades of grey generally indicate higher tract scores, though I occasionally switch the usual color scheme in order to improve intelligibility. Tracts for which data is missing are blank. For information on which raw variables are included in each composite factor, see *infra* app. tbl.1. For other examples of geographic units' factor scores being mapped, see Vicino, *supra* note 177, at 500–01; Wyly, *supra* note 180, at 330–31; Breitbart et al., *supra* note 166; Makse, *supra* note 77, at 20–23.

Factor score maps may also be useful to those who are entrusted with drawing district lines in the first instance. Even if they are under no obligation to do so, line-drawers may choose to design districts that are spatially homogeneous with regard to some or all of the factors. *See, e.g.*, Breitbart et al., *supra* note 166, at 24 ("The maps derived from . . . the principal components analysis . . . show coherent geographic patterns that can be used as the basis for drawing Senate districts.").

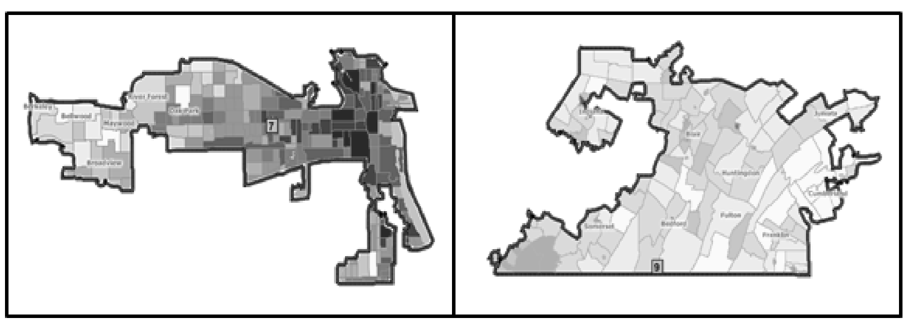
that fare very poorly (the West Side and Maywood). The Ninth, on the other hand, is uniformly low in its level of affluence. In terms of the urban/suburban factor, similarly, people in the western half of the Seventh tend to be married and to own their homes, while people in the eastern half tend to be single and to rent apartments. The Ninth's tracts, by comparison, almost all have high shares of married homeowners. The Seventh is also much more heterogeneous than the Ninth with regard to age as well as the various race-related factors — particularly African American background, which exhibits the same striking spatial pattern as socioeconomic status. Only in terms of the less significant white ethnic and agrarian factors are the districts similar in their levels of geographic variation.

FIGURE 8: FACTOR SCORE MAPS FOR ILLINOIS'S SEVENTH DISTRICT (LEFT) AND PENNSYLVANIA'S NINTH DISTRICT (RIGHT)

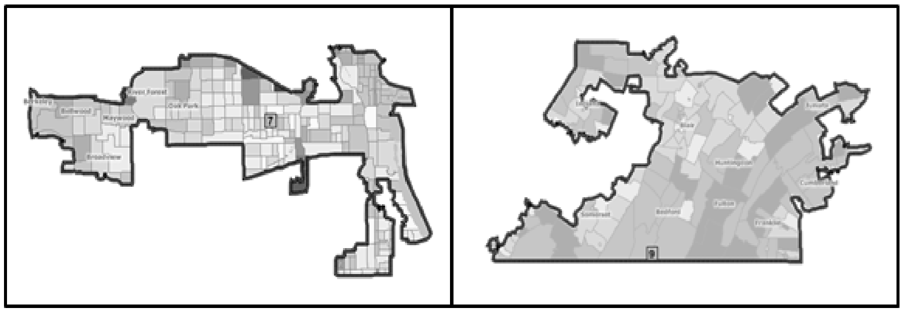
Factor 1 (Socioeconomic Status):



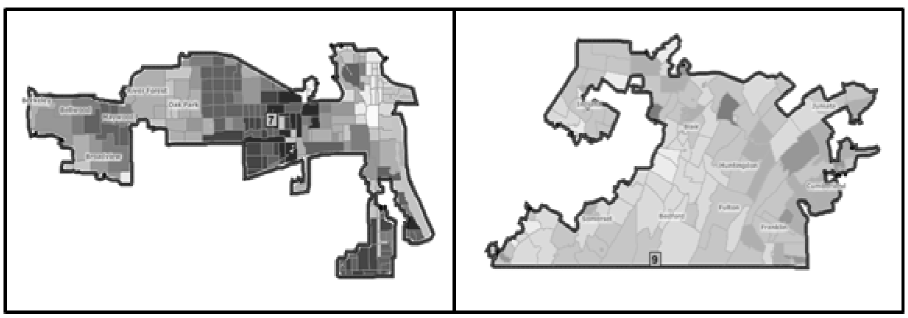
Factor 2 (Urban/Suburban Location):



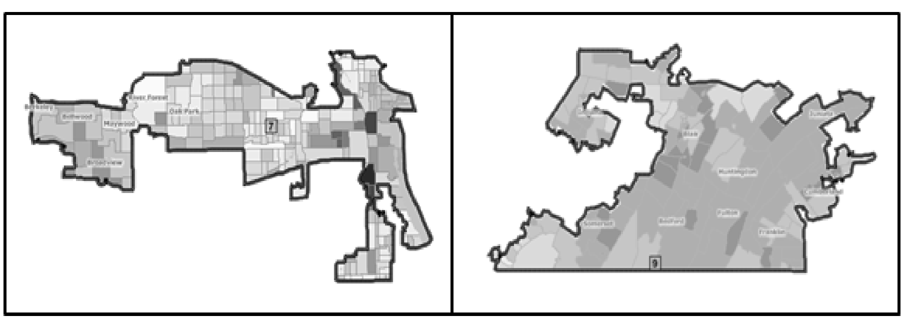
Factor 3 (Hispanic):



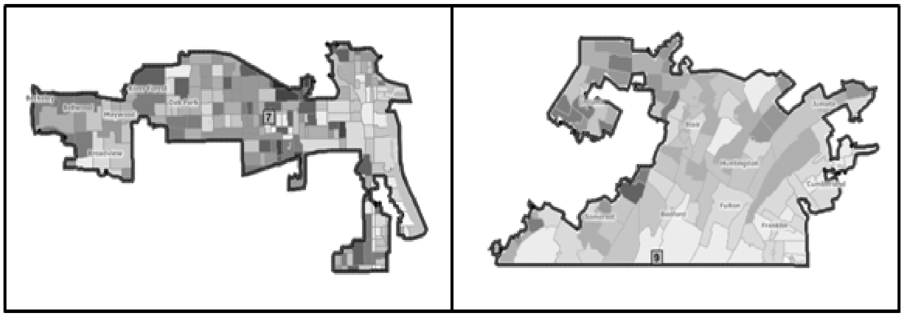
Factor 4 (African American):



Factor 5 (Asian American):

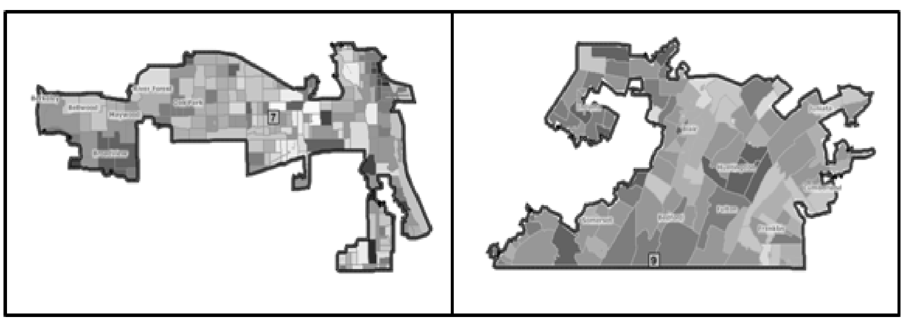


Factor 6 (White Ethnic):



Factor 7 (Age):

Factor 8 (Agrarian):



Analogous factor score maps, of course, could be produced for any other congressional districts. As with Illinois's Seventh and Pennsylvania's Ninth, the maps would depict the geographic patterns that account for the districts' factor-specific and overall spatial diversity ratings. Again, districts that resemble Illinois's Seventh in their heterogeneity (e.g., California's Eighth, New York's Fifth, Texas's Thirty-Second) might be more susceptible to legal challenge, while districts that resemble Pennsylvania's Ninth (e.g., Kentucky's Fifth, Alabama's Fourth, Tennessee's First) would be largely impervious — at least to claims based on district-specific gerrymandering or the disruption of communities of interest.[224]

For the sake of brevity, I do not provide all eight maps here for any more districts. Below in Figure 9, however, are a number of additional maps that show, for each composite factor, the districts across the country that are the most and least spatially diverse. These districts are not necessarily heterogeneous or homogeneous *overall*, but they are all outliers along at least one salient dimension. Courts (and scholars) may sometimes be more interested in these disaggregated rankings than in the holistic measure of spatial diversity that I typically employ.

For example, New York's Eighth District, which combines the wealthy west side of Manhattan with Brooklyn neighborhoods such as Borough Park and Brighton Beach, is the country's most spatially diverse constituency in terms of socioeconomic status.[225] New York's uniformly poor Sixteenth District, which occupies the heart of the South Bronx, is the country's most homogeneous in this respect.[226] California's Thirtieth District, which joins some of Los Angeles's tony northwestern suburbs with the city's Westside, is the most spatially varied constituency with regard to urban/suburban location.[227] New York's Fifteenth District, which takes up most of northern Manhattan, is the least diverse in this dimension.[228] Illinois's First District, which connects the heavily black South Side of Chicago to the mostly white suburbs lying southwest of the city, tops the charts in terms of African American spatial variation.[229] Ohio's Fifth District, located in the state's industrial (and very white) northwest, is the most uniform along this racial axis.[230] Florida's Nineteenth District, which merges retirement communities and family-oriented suburbs around Palm Beach, is the most spatially diverse with respect to age.[231] And California's For-

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[224] *See infra* app. tbl.4.

[225] *See infra* app. tbl.4; *New York 8th District: West Manhattan*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/ny/08 (last visited May 3, 2012).

[226] *See infra* app. tbl.4; *New York 16th District: South Bronx*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/ny/16 (last visited May 3, 2012).

[227] *See infra* app. tbl.4; *California 30th District: Part Los Angeles, Santa Monica*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/ca/30 (last visited May 3, 2012).

[228] *See infra* app. tbl.4; *New York 15th District: North Manhattan; Harlem*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/ny/15 (last visited May 3, 2012).

[229] *See infra* app. tbl.4; *Illinois 1st District: Chicago; South Side*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/il/01 (last visited May 3, 2012).

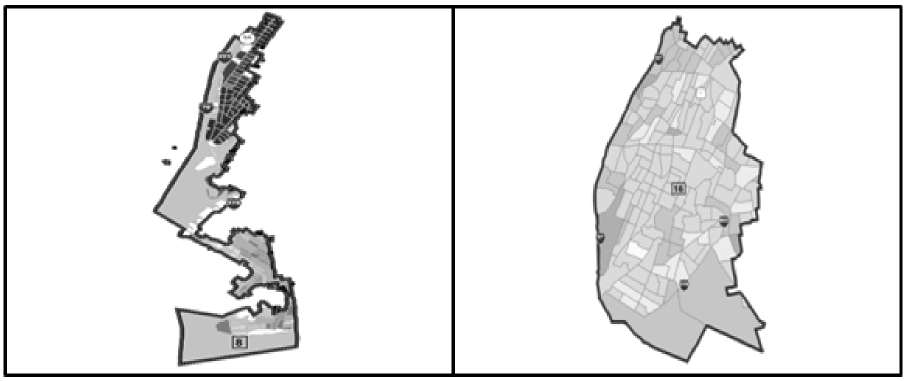
[230] *See infra* app. tbl.4; *Ohio 5th District: Northwest Ohio; Bowling Green*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/oh/05 (last visited May 3, 2012).

[231] *See infra* app. tbl.4; *Florida 19th District: South Florida; Part Boca Raton*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/fl/19 (last visited May 3, 2012).

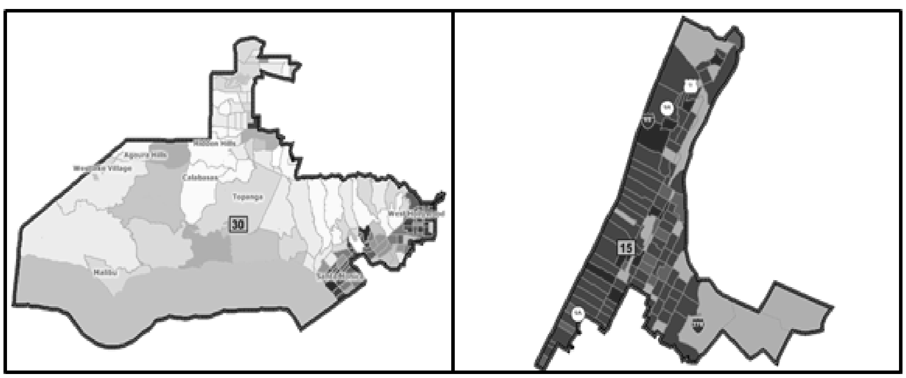
ty-Third District, made up of younger Hispanic areas around San Bernardino, is the most homogeneous in this regard.[232]

FIGURE 9: FACTOR SCORE MAPS FOR DISTRICTS WITH HIGHEST (LEFT) AND LOWEST (RIGHT) SPATIAL DIVERSITY ALONG EACH COMPOSITE FACTOR

Factor 1 (Socioeconomic Status): NY08 (Left) and NY16 (Right):

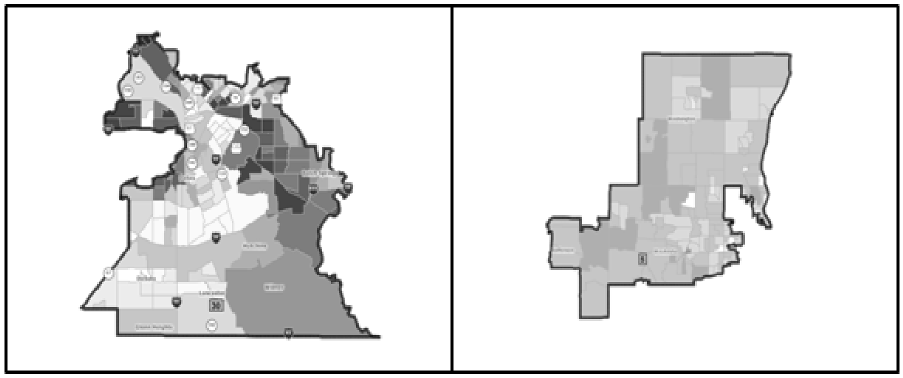


Factor 2 (Urban/Suburban Location): CA30 (Left) and NY15 (Right):

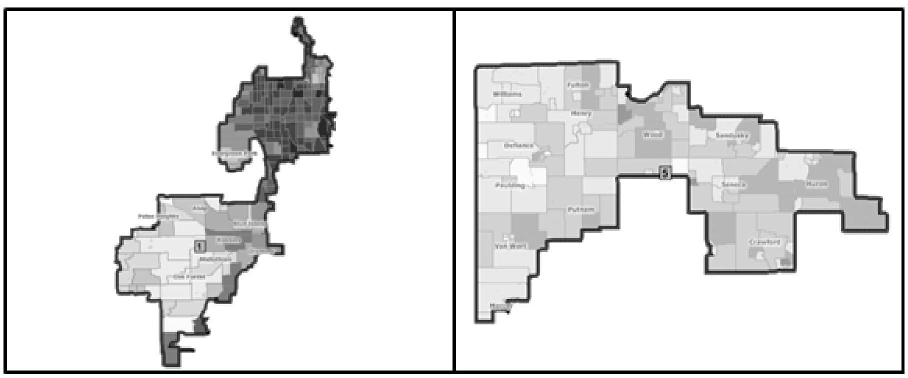


232 *See infra* app. tbl.4; *California 43rd District: Inland Empire; Ontario*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/ca/43 (last visited May 3, 2012).

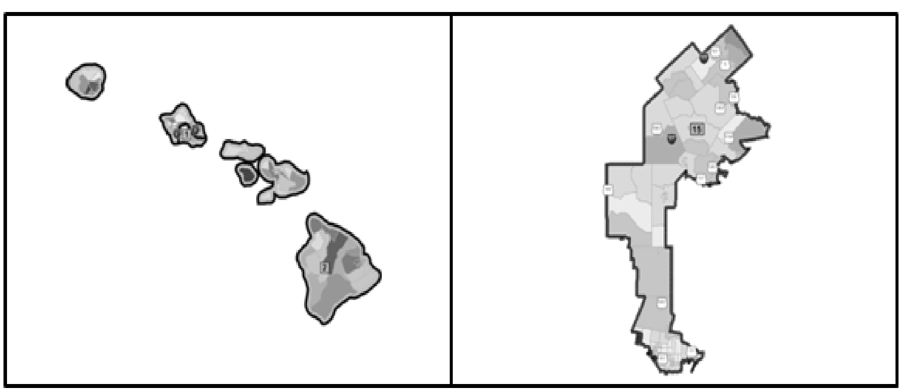
Factor 3 (Hispanic): TX30 (Left) and WI05 (Right):



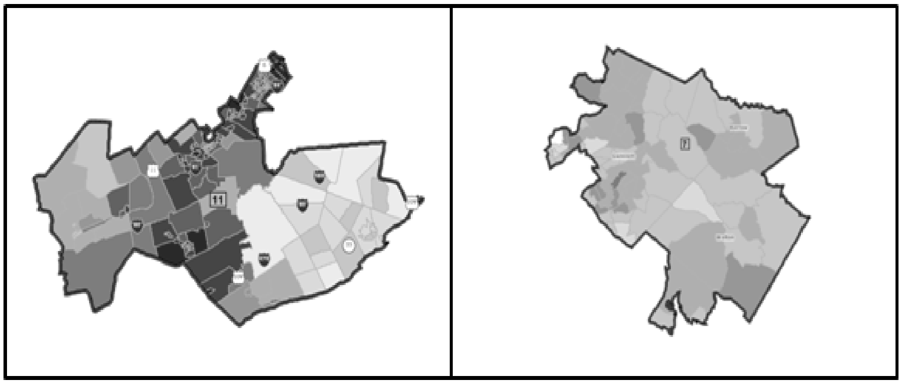
Factor 4 (African American): IL01 (Left) and OH05 (Right):



Factor 5 (Asian American): HI02 (Left) and TX15 (Right):

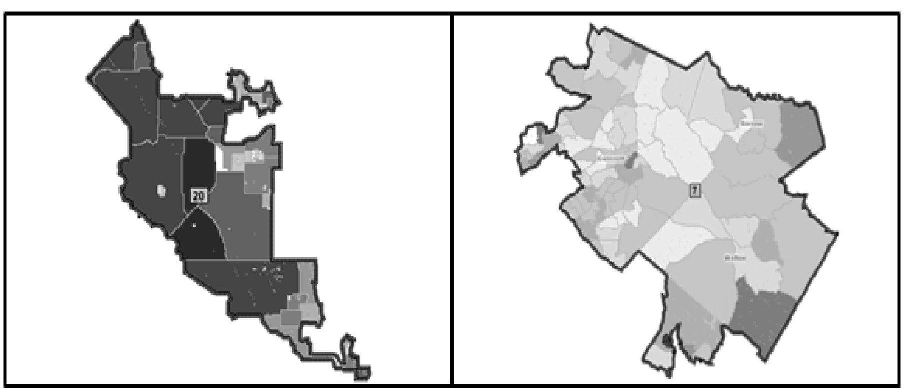


Factor 6 (White Ethnic): PA11 (Left) and GA07 (Right):



Factor 7 (Age): FL19 (Left) and CA43 (Right):

Factor 8 (Agrarian): CA20 (Left) and GA07 (Right):



In addition to evaluating individual districts, spatial diversity scores can be used to assess whole *states* based on the average heterogeneity of their constituent districts.[233] The higher the average of the spatial diversity scores of a state's districts, the more troublesome (and potentially the more gerrymandered) the state's plan. These statewide averages should be taken with a grain of salt, because they correlate to some degree with states' overall levels of demographic and socioeconomic diversity.[234] California and Texas, for instance, are so diverse overall that it should come as little surprise that they also contain many diverse districts. Still, the statewide averages do reflect the particular ways in which states' districts have been drawn,[235] so they are at least probative as to how well district plans in their entirety have been designed.

Table 5 in the Appendix lists all fifty states in order from highest average spatial diversity to lowest.[236] Among the states with at least two congressional districts (i.e., the states that need to redistrict each decade), Hawaii has the highest average because both of its districts, while otherwise nondescript, are extremely heterogeneous with respect to the Asian American composite factor.[237] Maine has the lowest average because its two districts both rank among the most homogeneous ten percent in the country.[238] Among the states with ten or more districts (for which these computations are more meaningful), California, New Jersey, Texas, New York, Massachusetts, and Illinois have particularly high averages, while Ohio, Pennsylvania, North Carolina, and Michigan have particularly low averages.[239] This is prima facie (though not conclusive) evidence that the former states have inferior district plans — more likely to hinder participation and representation,

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[233] *Cf.* Pildes & Niemi, *supra* note 14, at 571–73 tbl.6 (calculating statewide averages of districts' compactness scores), *cited in* Bush v. Vera, 517 U.S. 952, 960 (1996) (plurality opinion).

[234] In a sequel to this Article, I introduce a more complex — but also potentially more accurate — alternative to using states' raw spatial diversity averages: the calculation of states' residuals based on a regression of their raw averages against their intrinsic levels of heterogeneity and their numbers of districts. The higher the residual, the more problematic the district plan, and vice versa. *See* Stephanopoulos, *supra* note 173 (manuscript at 19–20) (detailing this methodology).

[235] For instance, the average spatial diversity of the congressional districts that California's Citizens Redistricting Commission recently drew is somewhat lower than the average spatial diversity of California's existing districts. California's high current average thus is not inevitable. *See id.* (manuscript at 12–14); *see also infra* pp. 1963–65 (finding relationships between statewide spatial diversity averages and measures of gerrymandering such as partisan bias and electoral responsiveness).

[236] *See infra* app. tbl.5. For states with just one congressional district, of course, redistricting can have no impact on the statewide average (which is the same as the average for the one district).

[237] *See infra* app. tbl.5.

[238] *See infra* app. tbls.4 & 5.

[239] *See infra* app. tbl.5.

more disruptive of communities, and more suggestive of political mischief — compared to the latter.

2. Revisiting Vieth. — To give a sense of how spatial diversity scores could be used in actual litigation, I reconsider here the Supreme Court's 2004 decision in *Vieth v. Jubelirer*. As discussed above,[240] the *Vieth* Court upheld Pennsylvania's congressional district plan, with a plurality concluding that political gerrymandering claims are inherently nonjusticiable.[241] Three separate dissents were filed, and two of them (by Justice Souter and Justice Stevens) singled out the Republican-leaning Sixth District, located in Philadelphia's western suburbs, as a particularly problematic constituency.[242] How does *Vieth* look through the prism of spatial diversity?

To begin with, it seems that the Court was right not to get too exercised about the plan as a whole. As Table 5 indicates, Pennsylvania's districts have an average spatial diversity that places them *thirty-third* in the country, substantially closer to the bottom of the list than to the top.[243] Among the states with ten or more districts, only Ohio's districts are more spatially homogeneous on average (and only barely at that).[244] To the extent that spatial diversity may be relevant to the statewide gerrymandering inquiry, it therefore weighs in favor of the Court's decision to affirm the plan.

To evaluate Justice Souter and Justice Stevens's claims about the Sixth District, I carried out a Pennsylvania-specific factor analysis that was otherwise identical to my procedure for the entire country.[245] This more focused analysis produced more accurate information about the factors that account for Pennsylvania's particular residential patterns. When only a single state is at issue, it is also preferable to examine only that state's Census tracts (since district boundaries, of course, cannot cross state lines).[246]

As Table 6 in the Appendix shows, the composite factors that emerged for Pennsylvania alone are similar, but not identical, to the factors for the country as a whole.[247] There are only six factors (rather than eight), and while socioeconomic status remains the factor with the greatest explanatory power, the African American factor is now second

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[240] *See supra* pp. 1925, 1928.

[241] *See* 541 U.S. 267, 281–301 (2004) (plurality opinion).

[242] *See id.* at 328, 331, 339 (Stevens, J., dissenting); *id.* at 349 (Souter, J., dissenting) (noting that Sixth District might support valid political gerrymandering claim).

[243] *See infra* app. tbl.5.

[244] *See id.*

[245] *See supra* section III.A, pp. 1936–41 (explaining methodology for nationwide analysis).

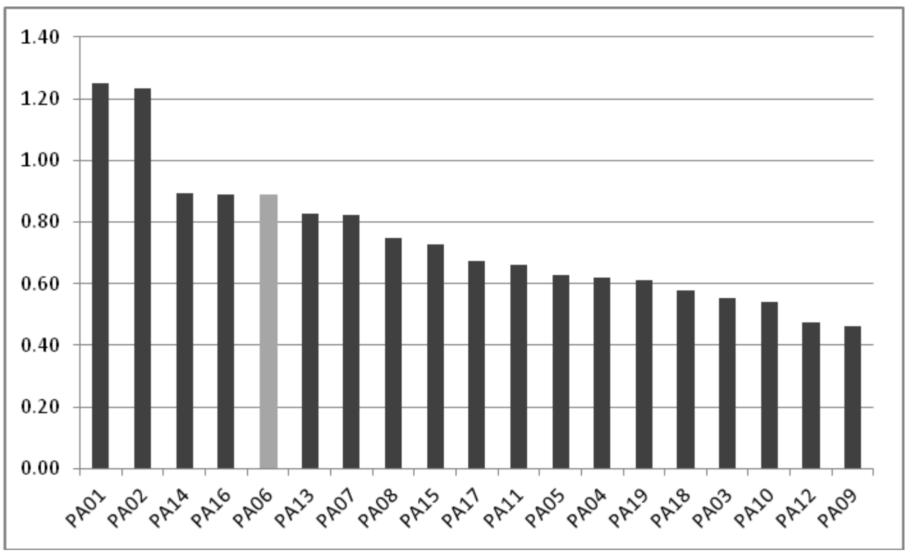
[246] Though the state-specific procedure is more accurate, its results do not differ greatly from the national analysis. In fact, the ordinal ranking of Pennsylvania's districts by their spatial diversity is almost identical under both approaches.

[247] *See infra* app. tbl.6.

(rather than fourth), the factors for urban/suburban location and for Hispanic ethnicity have both dropped by one spot, and the factors for age and for agricultural employment no longer register at all.[248] Pennsylvania's residential patterns thus differ in subtle ways from those of the country at large.

Table 7 in the Appendix lists the spatial diversity scores, both factor-specific and overall, for Pennsylvania's nineteen districts.[249] The overall scores are also displayed in Figure 10. As is evident from both the table and the chart, the Sixth District performs quite poorly in terms of spatial diversity, but it is not the worst offender in the state.

FIGURE 10: SPATIAL DIVERSITY SCORES FOR PENNSYLVANIA CONGRESSIONAL DISTRICTS



More specifically, the Sixth District is the fifth-most heterogeneous constituency in Pennsylvania (and essentially tied for third), but it is substantially less varied than the Philadelphia-based First and Second Districts.[250] It was therefore reasonable for Justice Souter and Justice Stevens to worry more about the Sixth District than about superficially similar constituencies elsewhere in the state: for instance, the Eighteenth District, which is also suburban and oddly shaped, and which

[248] *Compare infra* app. tbl.6, *with infra* app. tbl.5.

[249] *See infra* app. tbl.7.

[250] The nationwide scores computed earlier confirm this ranking. The Sixth District is the 136th most spatially diverse district in the country, while the First and Second Districts, respectively, are 41st and 37th. *See infra* app. tbl.4. This is further evidence that the Sixth District is not an outlier, by national standards, in terms of spatial diversity.

was also challenged by the *Vieth* plaintiffs and designed to elect a Republican member,[251] but which is much less heterogeneous. However, if it was in fact spatial diversity that concerned the Justices, then they should also have directed some of their criticism at the (equally diverse) Fourteenth and Sixteenth Districts and the (more diverse) First and Second Districts.

FIGURE 11: SOCIOECONOMIC STATUS MAP FOR PENNSYLVANIA'S SIXTH DISTRICT

On the other hand, if it was *socioeconomic* diversity that concerned the Justices, then perhaps they were right to focus on the Sixth District after all. As Table 7 reveals, the Sixth is more or less tied with the Second for the title of most heterogeneous in the state with respect to socioeconomic status (the most important of the six composite factors).[252] The map in Figure 11 depicts the Sixth's high variation along this dimension. The district combines highly affluent areas such as Philadelphia's Main Line suburbs with much less privileged locales such as eastern Berks County and western Chester County. In the words of the *National Journal Almanac*, the district encompasses both "[t]he

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[251] *See Vieth* Brief, *supra* note 2, at 13, 47–49; *Pennsylvania 18th District: Pittsburgh Metro Area*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/pa/18 (last visited May 3, 2012).

[252] *See infra* app. tbl.7.

most lavish Philadelphia suburbs . . . home to some of [the city's] wealthiest people" and "decaying industrial town[s]" with "[some] of the state's highest unemployment rates."[253] The Justices' emphasis on the Sixth was therefore more appropriate than it might seem given the district's bad-but-not-terrible overall rating. In terms of the most significant composite factor, the Sixth indeed exhibits a disturbingly high level of spatial heterogeneity.

3. Bias and Responsiveness. — The final political gerrymandering issue that I investigate is how spatial diversity relates to common district plan metrics such as partisan bias and electoral responsiveness. As noted earlier, partisan bias refers to the divergence in the share of seats that each party would win given the same share of the statewide vote.[254] For example, if Democrats would win forty-eight percent of the seats with fifty percent of the vote (in which case Republicans would win fifty-two percent of the seats), then a district plan would have a pro-Republican bias of two percent. Electoral responsiveness refers to the rate at which a party gains or loses seats given changes in its statewide vote share. For instance, if Democrats would win ten percent more seats if they received five percent more of the vote, then a plan would have a responsiveness of 2.0.[255] As a general matter, the lower a plan's bias, and the higher its responsiveness, the better the plan is thought to be.[256]

I calculated bias and responsiveness using the results of the last three congressional elections (2006, 2008, and 2010).[257] To determine the statewide seat shares that the parties would have won given different statewide vote shares, I relied on what political scientists refer to as the uniform swing assumption.[258] This assumption stipulates that

[253] *See Pennsylvania 6th District: Chester and Montgomery Counties*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/pa/06 (last visited May 3, 2012). While interesting, the Sixth District's heterogeneity in terms of socioeconomic status is not as significant, in my view, as its aggregate spatial diversity incorporating all of the composite factors.

[254] *See supra* note 11 and accompanying text.

[255] *See* Gelman & King, *supra* note 11, at 544–45 (defining bias and responsiveness).

[256] Reducing bias all the way to zero is unproblematic. However, very high rates of responsiveness are undesirable because they result in large changes in seat shares despite only small shifts in vote shares. Fortunately, the responsiveness scores reported here are not high enough to raise such concerns.

[257] *See Election Statistics*, OFF. OF THE CLERK OF THE U.S. HOUSE OF REPRESENTATIVES, http://clerk.house.gov/member_info/electionInfo/index.aspx (last visited May 3, 2012). I used congressional rather than presidential election data because, unlike some researchers, *see, e.g.*, Chen & Rodden, *supra* note 188, I *am* interested in how the incumbency advantage may affect district plans' levels of bias and responsiveness. Line-drawers, of course, take incumbency heavily into account when they devise new district boundaries.

[258] *See, e.g.*, Janet Campagna & Bernard Grofman, *Party Control and Bias in 1980s Congressional Redistricting*, 52 J. POL. 1242, 1247–48 (1990); Simon Jackman, *Measuring Electoral Bias: Australia, 1949–93*, 24 BRIT. J. POL. SCI. 319, 331–37 (1994); Chen & Rodden, *supra* note 188, at 14–15.

the parties' *district-specific* vote shares change (or "swing") by the same margin as do their *statewide* vote shares. For example, if the Democrats received forty-five percent of the vote in a state, and a researcher wanted to know how many seats they would have won if they had received fifty percent, the researcher would simply add five percent to the actual Democratic vote shares in each district. The assumption simplifies political realities, of course, but the estimates that it generates for statewide seat shares are considered quite accurate.[259]

Figures 12 and 13 show how states' spatial diversity averages were related to partisan bias and electoral responsiveness in the 2006, 2008, and 2010 elections.[260] I include only states with at least ten congressional districts (because bias and responsiveness are not very meaningful for states with small numbers of seats),[261] and I use the absolute value of bias (because I am interested in the metric's magnitude rather than its orientation). As is evident from the first chart, spatial diversity has a curvilinear relationship with bias. At lower levels of spatial diversity, that is, bias tends to decrease as spatial diversity increases; but at higher levels of spatial diversity, bias and spatial diversity tend to move in tandem. The curve as a whole is clearly U-shaped.[262]

This result suggests that states seeking to treat the major parties as equitably as possible should *not* minimize the average spatial diversity of their districts. Consistent with the relevant literature, high levels of geographic variation are associated with high bias;[263] they both imply

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259 *See, e.g.*, Campagna & Grofman, *supra* note 258, at 1247 ("[T]he assumption of uniform swing . . . appropriately models the types of change, i.e. partisan shifts, that we are interested in . . . ."); Bernard Grofman & Gary King, *The Future of Partisan Symmetry as a Judicial Test for Partisan Gerrymandering After* LULAC v. Perry, 6 ELECTION L.J. 2, 11 (2007) ("[I]t is remarkable that the uniform partisan swing assumption does hold approximately in a vast array of democratic elections in the U.S. . . . ."). There is also software for calculating bias and responsiveness that loosens the uniform swing assumption. *See* Andrew Gelman et al., JudgeIt II: A Program for Evaluating Electoral Systems and Redistricting Plans, *available at* http://gking.harvard.edu/judgeit. The results generated by the software typically do not differ greatly from those produced through the conventional method.

260 For an example of another study that analyzes bias and responsiveness using scatter plots, see Thomas R. Belin et al., *Using a Density-Variation/Compactness Measure to Evaluate Redistricting Plans for Partisan Bias and Electoral Responsiveness*, 2 STAT. POL. & POL'Y 1, 10–13 (2011).

261 The results are nevertheless similar if all states with at least five congressional districts are included in the analysis. Spatial diversity continues to have a curvilinear relationship with bias and to correlate negatively with responsiveness, though the patterns are not quite as pronounced. The results are also similar if states' regression residuals, *see supra* note 234, are used instead of their raw spatial diversity averages.

262 I use the quadratic best fit line here because a quadratic regression model (R^2 = 0.66) captures much more of the data's variance than a linear regression model (R^2 = 0.01). *Cf.* CAMPBELL, *supra* note 26, at 38–39 (also using quadratic model in investigation of county heterogeneity). For all of the other scatter plots in this Article, the linear and quadratic models did not differ significantly, and I therefore used the linear best fit line.

263 *See supra* pp. 1921–22.

that traditional districting criteria have been neglected, and enable the execution of the optimal "matching slices" gerrymandering strategy — by which groups of one party's voters are paired with slightly smaller groups of the opposing party's voters.[264] But low levels of variation are linked to high bias as well, presumably because parties' supporters are excessively "packed" when most districts are very homogeneous. The ideal level of spatial diversity (in that it minimizes bias) appears to lie in the center of the distribution — not so high that natural geographic alignments are swept aside for the sake of partisan advantage, but not so low that the parties' devotees end up overconcentrated. At this Goldilocks position, neither of the usual gerrymandering strategies can be carried out to full effect, and partisan fairness reaches its apogee.

The story with responsiveness is more straightforward. As the second chart illustrates, responsiveness simply tends to decrease as average spatial diversity increases. The states whose districts are most homogeneous, on average, are also the states whose elections are most responsive to changes in public opinion. In contrast, the states whose districts are most heterogeneous are also the ones in which even large swings in voter sentiment have little impact on the parties' seat shares. This finding indicates that while high spatial diversity is not a prerequisite for a *partisan* gerrymander (low spatial diversity can also do the trick), it is indeed an effective way to protect incumbents of *both* parties from shifting political tides. Advocates of responsive elections, then, may push without hesitation for spatially homogeneous districts to be drawn, since it is these districts that seem most likely (in the aggregate) to reflect the public's evolving preferences.[265]

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[264] In a recent article, Professors Adam Cox and Richard Holden argue that "matching slices" is the optimal gerrymandering strategy because it makes the most efficient use of a party's most committed supporters. *See* Cox & Holden, *supra* note 192, at 567. The districts that the strategy produces tend to be spatially heterogeneous since they deliberately combine dissimilar groups of voters. *See id.*

[265] This conclusion is consistent with the positive correlation that I found between district-level spatial diversity and electoral margin of victory. Spatially diverse districts tend to have larger margins of victory than spatially homogeneous districts; that is, they are less competitive. *See also supra* notes 85–88 and accompanying text (discussing existing scholarship that found higher competitiveness in districts that are more congruent with political subdivisions and media markets).

FIGURE 12: PARTISAN BIAS VERSUS SPATIAL DIVERSITY IN 2006–2010 ELECTIONS

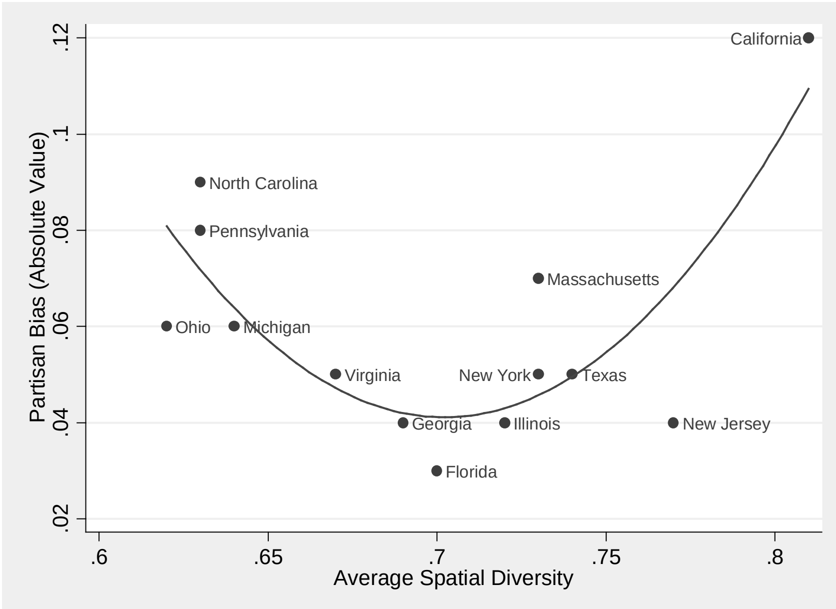
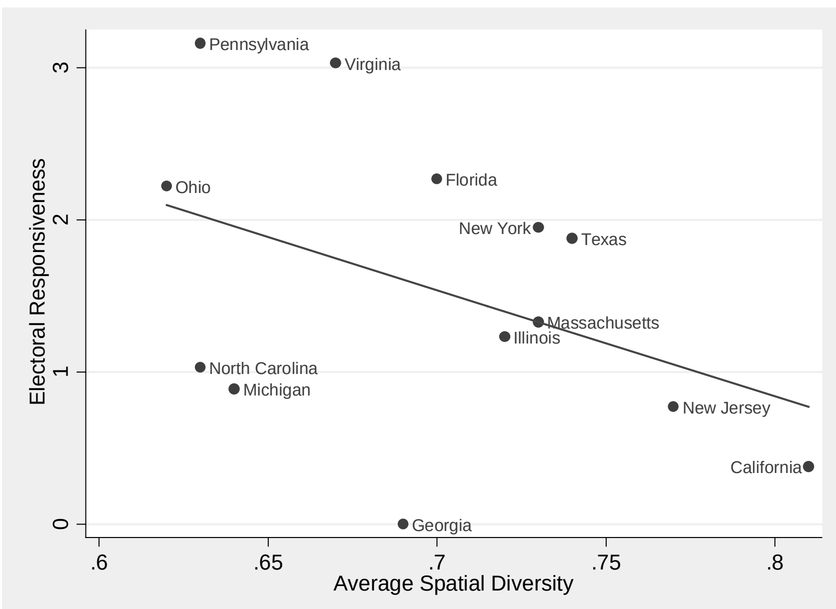


FIGURE 13: ELECTORAL RESPONSIVENESS VERSUS SPATIAL DIVERSITY IN 2006–2010 ELECTIONS



D. Race and Redistricting

Until now, I have quantified only the spatial diversity of districts as a whole. But in the Court's racial vote dilution and racial gerrymandering case law, it is not the heterogeneity of districts' *entire* populations that matters, but rather the heterogeneity of their *minority* populations.[266] In this section, I therefore focus on the distinctive residential patterns of minority groups. I first identify heavily minority districts that might be especially exposed to (or safe from) statutory or constitutional attack. I then revisit the Court's decision in *LULAC* in order to assess empirically the claims made by the majority and the dissenters about various Texas districts.

1. Identifying Vulnerable Districts. — The geographic variation of districts' minority populations plays a major role in two doctrinal contexts. First, in the field of racial vote dilution, it is only spatially homogeneous minority populations (of sufficient size) that are legally entitled to districts in which they can elect the representatives of their choice. Districts that contain spatially heterogeneous minority populations cannot remedy any vote dilution that may have occurred.[267] Second, in the realm of racial gerrymandering, it is districts whose minority residents vary spatially along key dimensions that are most constitutionally suspect. Districts that coincide with more uniform minority communities generally pass constitutional muster.[268]

To quantify the geographic variation of districts' minority populations, I carried out two more versions of my original factor analysis, one for all Census tracts nationwide that are at least forty percent African American, and another for all tracts that are at least forty percent Hispanic.[269] About half of all African Americans and Hispanics live in these tracts, despite their relatively small number.[270] The tracts represent essentially all of the areas across the country that are home to spatially concentrated minority populations — which are the kinds

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[266] *See supra* note 124 and accompanying text.

[267] *See supra* section II.B, pp. 1929–33 (discussing Court's vote dilution case law).

[268] *See supra* section II.C, pp. 1933–35 (discussing Court's racial gerrymandering case law).

[269] Other racial minority groups are not large or concentrated enough to warrant separate examination. Asian Americans, for example, constitute less than five percent of the U.S. population, *USA Quick Facts*, U.S. CENSUS BUREAU, http://quickfacts.census.gov/qfd/states/00000.html (last updated Jan. 17, 2012, 4:42 PM), and are numerous enough to constitute congressional district majorities in only a handful of areas nationwide.

[270] Out of 65,273 total tracts, 7960 are at least forty percent African American, and 7048 are at least forty percent Hispanic. Fifty percent of all African Americans and fifty-two percent of all Hispanics, respectively, live in these heavily minority tracts. The numbers of tracts incorporated into the various factor analyses are slightly smaller because tracts with incomplete data could not be used.

of populations, of course, that are most relevant to both the racial vote dilution and the racial gerrymandering inquiries.[271]

As with the Pennsylvania-specific procedure,[272] the composite factors that emerged from these minority-targeted analyses are similar, but not identical, to the factors for all tracts nationwide. With regard to the heavily African American tracts, there are six factors (rather than eight). Socioeconomic status remains the most important factor, the urban/suburban factor has dropped from second to fourth place, the Asian American, white ethnic, and agrarian factors no longer register, and a new factor for employment in construction has appeared.[273] With respect to the heavily Hispanic tracts, eight factors emerged. The urban/suburban factor is now the most influential, the African American and white ethnic factors no longer register, and new factors for both construction and manufacturing employment have materialized.[274] The residential patterns of minority groups thus differ in interesting ways from those of the population at large.

Tables 10 and 11 in the Appendix list all congressional districts whose residents are more than forty percent African American or Hispanic, in order by the spatial heterogeneity of their respective minority populations.[275] These seventy-two constituencies approximate the universe of districts to which the Court's racial vote dilution and racial gerrymandering doctrines are potentially applicable.[276] As Figures 14 and 15 demonstrate, heavily African American and heavily Hispanic districts do *not* have identical spatial diversity distributions.[277] The median African American district has a more geographically varied minority population than the median Hispanic district. But the African American distribution is more condensed (i.e., it has a smaller standard deviation) and has fewer outliers in either direction. In par-

[271] It might be preferable to focus not on *tracts* that have large minority populations (but that are also home to many other residents) but rather on the minority populations *themselves*. Unfortunately, the ACS data does not allow this sort of analysis. Still, my results were not appreciably different when I examined tracts that were thirty, fifty, or sixty percent African American or Hispanic. *Cf.* John R. Logan & Wenquan Zhang, *Identifying Ethnic Neighborhoods with Census Data*, *in* SPATIALLY INTEGRATED SOCIAL SCIENCE 113, 116–17 (Michael F. Goodchild & Donald G. Janelle eds., 2004) (also analyzing minority populations by examining tracts with large minority population shares).

[272] *See supra* section III.C.2, pp. 1960–63.

[273] *See infra* app. tbl.8.

[274] *See infra* app. tbl.9.

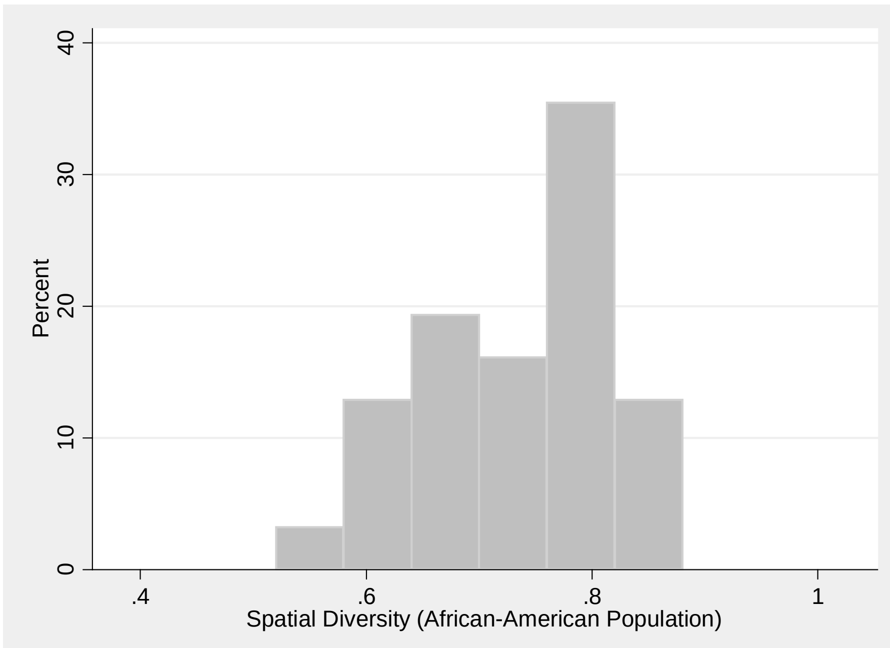
[275] *See infra* app. tbls.10–11.

[276] If anything, the relevant universe is smaller, because the Court has never struck down a non-majority-minority district as a racial gerrymander, and because a cause of action can only be stated under section 2 of the VRA if the relevant minority group could constitute the majority of a single-member district. *See* Bartlett v. Strickland, 129 S. Ct. 1231, 1246, 1249 (2009). Moreover, I consider all districts whose *whole* populations are at least forty percent African American or Hispanic, while the more relevant figure may be the racial share of the *citizen voting-age* population.

[277] *See infra* Figures 14–15.

ticular, there are *no* obvious African American outliers in the high spatial diversity direction — which suggests that line-drawers learned the right lesson from the Court's 1990s racial gerrymandering decisions, and stopped designing overly heterogeneous majority-black districts.[278]

FIGURE 14: HISTOGRAM OF HEAVILY AFRICAN AMERICAN DISTRICTS' SPATIAL DIVERSITY SCORES



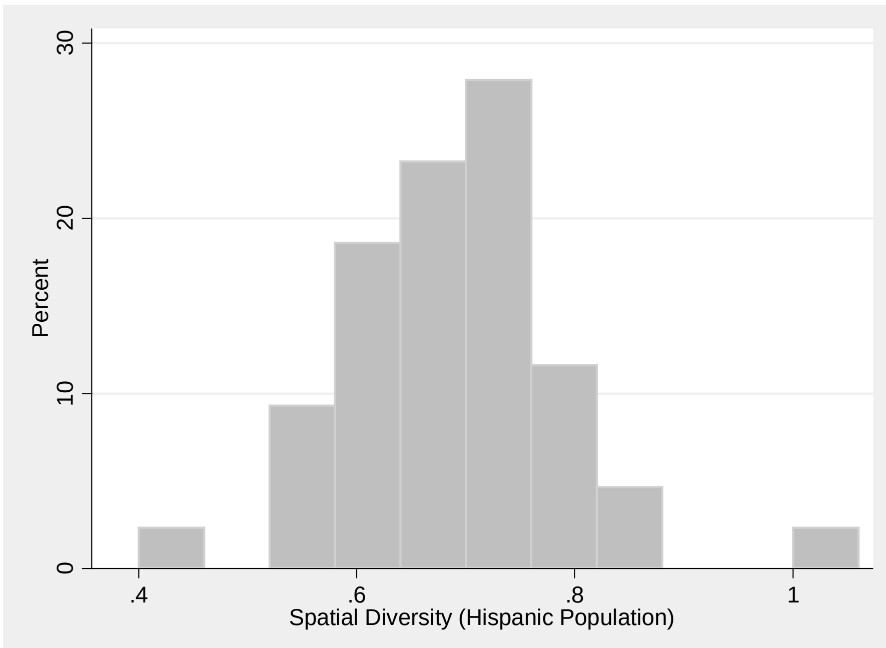
It is also instructive to compare the African American and Hispanic distributions with the distribution of *all* districts (incorporating *all* Census tracts) nationwide.[279] The minority populations of heavily minority districts are somewhat more spatially heterogeneous, on average, than the whole populations of all the country's districts. But the standard deviations of the minority distributions are substantially smaller, and their right tails are not nearly as pronounced. This is evidence that most of the country's worst gerrymandering (in the sense of very high spatial diversity) does not involve concentrated minority

[278] *See supra* section II.C, pp. 1933–35; *see also* Richard H. Pildes, *The Supreme Court, 2003 Term — Foreword: The Constitutionalization of Democratic Politics*, 118 HARV. L. REV. 28, 67–68 (2004) (noting the failure of almost every racial gerrymandering lawsuit in the 2000s).

[279] *See supra* Figure 7 (spatial diversity histogram of all congressional districts). This is admittedly a bit of an apples-to-oranges comparison, but it still indicates that minority populations in heavily minority districts are not exceptionally spatially heterogeneous.

populations. Notably, of the seventy-two districts that are at least forty percent African American or Hispanic, only three have minority populations that are as spatially heterogeneous as the fifty worst districts overall.

FIGURE 15: HISTOGRAM OF HEAVILY HISPANIC DISTRICTS' SPATIAL DIVERSITY SCORES



The current picture for heavily minority districts is therefore more encouraging than one might expect given the controversy that surrounds the Court's racial vote dilution and racial gerrymandering cases. Whatever the situation may have been in previous decades, today's heavily minority districts do not contain minority populations that are particularly heterogeneous. Still, it is possible to identify a handful of districts that remain problematic because of the high geographic variation of their minority residents. Two of these (both majority-Hispanic) are in Florida: the Eighteenth District, which runs down the coast from Miami to the Florida Keys, and the Twenty-First District, which forms an oblong strip in inland Miami-Dade and Broward Counties. A third (with an African American majority) is Maryland's Fourth District, which comprises suburbs to the north and east of Washington, D.C.

As the Appendix tables indicate, the minority populations of these three districts are the most spatially heterogeneous in America.[280] Figures 16 through 18 highlight certain dimensions along which the populations' geographic variation is especially apparent. With respect to socioeconomic status, for instance, the Hispanic population of Florida's Eighteenth District includes both very poor neighborhoods in downtown Miami and very affluent areas such as South Beach, Coral Gables, and Key Biscayne.[281] Similarly, the Hispanic population of Florida's Twenty-First District encompasses both retirement communities around Hialeah and the demographically younger cities of Doral and Miramar.[282] And the African American population of Maryland's Fourth District comprises both inner-ring suburbs of Washington, which resemble the city in their poverty and high proportion of renters, and prosperous outer-ring suburbs whose residents are mostly married homeowners.[283]

Of course, this data in no way *proves* that these districts are not required by the VRA (let alone that they are unlawful racial gerrymanders). The districts' minority residents may well feel a subjective sense of connection despite their demographic and socioeconomic differences. Geographic realities also may have made it difficult to design districts in these areas that contained more homogeneous minority populations. For example, it is hard to see how Key Biscayne could have been separated from Miami, or how the inner-ring suburbs of Prince George's County could have been divided from the outer-ring suburbs. Nevertheless, evidence that a district's minority population varies spatially in key respects is still quite probative. Even if it does not dispose of the issues, it at least suggests that the population is not compact and cohesive enough to warrant its own district under the VRA, and that race may have played a larger role than usual in the district's creation.[284]

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[280] *See infra* app. tbls.10–11. The districts' minority populations are also the most spatially heterogeneous in the country with respect to each of the composite factors displayed in the maps.

[281] *See Florida 18th District: South Florida; Miami*, NAT'L J. ALMANAC, http://nationaljournal.com/almanac/area/fl/18 (last visited May 3, 2012). For ease of presentation, only the northern half of this district (which includes most of its population) is displayed.

[282] *See Florida 21st District: South Florida; Hialeah*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/fl/21 (last visited May 3, 2012).

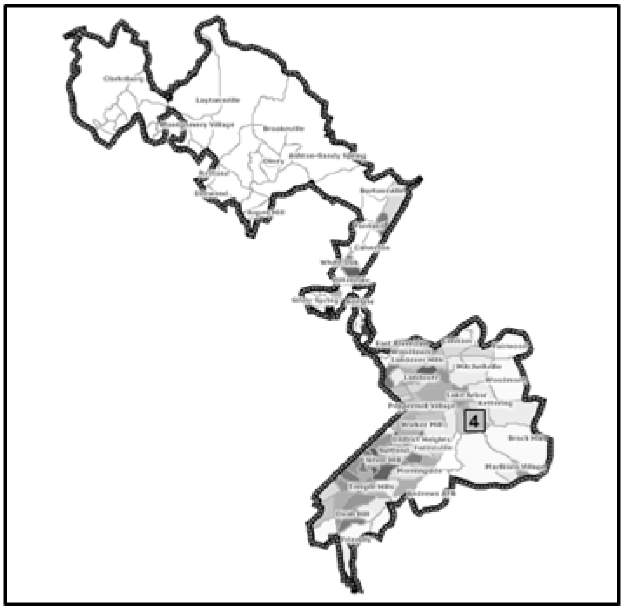
[283] *See Maryland 4th District: Prince George's County*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/md/04 (last visited May 3, 2012).

[284] *Cf.* Breitbart et al., *supra* note 166, at 25 (using similar factor-analytic approach to "ensure that the black or Hispanic majorities in the resulting districts would have shared characteristics and interests extending far beyond race or Hispanic origin"); *id.* at 26–31.

FIGURE 16: SOCIOECONOMIC STATUS MAP FOR FLORIDA'S EIGHTEENTH DISTRICT (HISPANIC TRACTS ONLY)

FIGURE 17: AGE MAP FOR FLORIDA'S TWENTY-FIRST DISTRICT (HISPANIC TRACTS ONLY)

FIGURE 18: URBAN/SUBURBAN MAP FOR MARYLAND'S FOURTH DISTRICT (AFRICAN AMERICAN TRACTS ONLY)



Conversely, evidence that a district's minority population is spatially homogeneous implies that the district may be required by the VRA, and that it is safe from constitutional attack. Consider Illinois's well-known "earmuffs" district, which joins Hispanic communities in Chicago's North and South Sides via a long and winding connector.[285] As Figure 19 illustrates, the district is shaped very strangely, but its residents are actually quite similar in their defining characteristics. In particular, the district's Hispanic population ranks thirty-fourth in geographic variation (out of forty-three), much closer to the bottom of the nationwide list than the top.[286] It therefore should come as little surprise that a three-judge district court twice held that the district was necessary under the VRA and constitutionally legitimate.[287] As

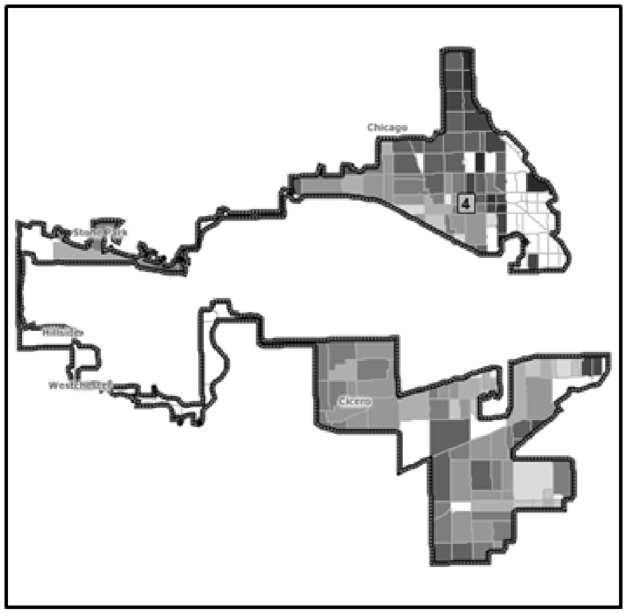
[285] *See Illinois 4th District: Chicago; North and Southwest Sides*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/il/04 (last visited May 3, 2012). Interestingly, the Fourth District forms a sheath around the Seventh, which is the country's most spatially diverse constituency overall. *See supra* section III.C.1, pp. 1949–60.

[286] *See infra* app. tbl.11.

[287] *See* King v. State Bd. of Elections (*King II*), 979 F. Supp. 619 (N.D. Ill. 1997) (three-judge court); King v. State Bd. of Elections (*King I*), 979 F. Supp. 582 (N.D. Ill. 1996) (three-judge court), *vacated*, 519 U.S. 978 (1996). These decisions involved the Fourth District as it was drawn in the 1990s, but that earlier rendition had the same basic shape as the current constituency.

the court observed, there are "common political, economic and social concerns that affect both Mexican-Americans [in the South Side] and Puerto Ricans [in the North Side]."[288]

FIGURE 19: SOCIOECONOMIC STATUS MAP FOR ILLINOIS'S FOURTH DISTRICT (HISPANIC TRACTS ONLY)



Similarly, North Carolina's First District aggregates African Americans throughout the northeastern part of the state, and features several odd-looking tentacles.[289] But the district's poor and rural African American population is highly homogeneous, placing twenty-eighth in geographic variation out of the country's thirty-one heavily black districts.[290] This district too was upheld by the courts, with one judge approvingly citing testimony that it is "a largely agrarian rural district" made up of areas that are "very high up on our economic tiers of depressed counties."[291] As with Illinois's "earmuffs" district, the high

[288] *King I*, 979 F. Supp. at 613 n.59 (citing the testimony of Congressman Luis Gutierrez); *see also id.* (referring to the "historical as well as present-day solidarity and cohesiveness of the Chicago Latino community"); *Illinois 4th District: Chicago; North and Southwest Sides*, *supra* note 285 (explaining the geographic distribution of the Fourth District's Hispanic community).

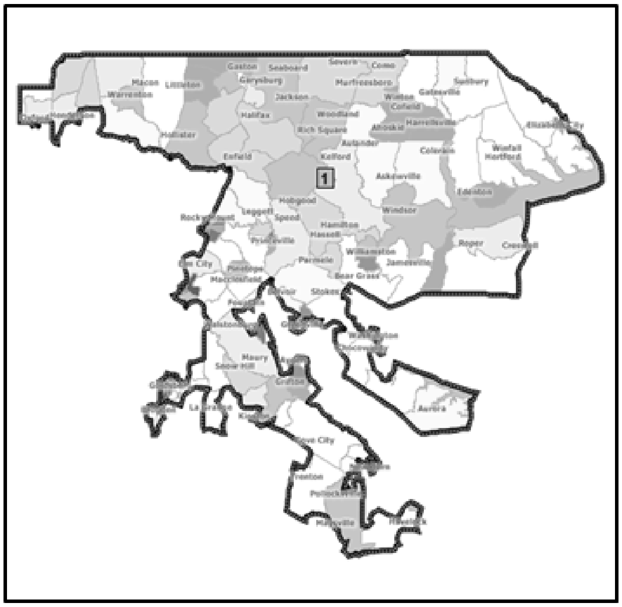
[289] *See North Carolina 1st District: Northern Region; Part Goldsboro*, NAT'L J. ALMANAC, http://www.nationaljournal.com/almanac/area/nc/01 (last visited May 3, 2012).

[290] *See infra* app. tbl.10.

[291] Cromartie v. Hunt, 133 F. Supp. 2d 407, 432 (E.D.N.C. 2000) (Thornburg, J., concurring in part and dissenting in part), *rev'd on other grounds sub nom.*, Easley v. Cromartie, 532 U.S. 234

spatial uniformity of its minority voters insulated North Carolina's First District from both statutory and constitutional challenge.[292]

FIGURE 20: URBAN/SUBURBAN MAP FOR NORTH CAROLINA'S FIRST DISTRICT (AFRICAN AMERICAN TRACTS ONLY)



2. Revisiting LULAC. — Finally, I revisit the Supreme Court's 2006 decision in *LULAC* in order to evaluate the claims that the majority and Chief Justice Roberts's dissent made about certain Texas districts. As discussed above,[293] the majority held that Texas's old Twenty-Third District contained a spatially homogeneous minority population (and thus was a valid section 2 district), but that the new Twenty-Fifth District's Hispanic residents were too heterogeneous for it to count as a legitimate section 2 remedy.[294] In dissent, Chief Justice Roberts argued that the old Twenty-Third's Hispanic population was *more* spatially varied than the new Twenty-Fifth's, and therefore that

(2001). This decision involved the 1990s version of the First District, but the 2000s version is not very different.

[292] As these examples suggest, and as my empirical analysis confirms, districts' geographic compactness has little connection to their level of spatial diversity. A district may be shaped very strangely but be very spatially homogeneous, and vice versa.

[293] *See supra* notes 137–46 and accompanying text.

[294] *See LULAC*, 548 U.S. 399, 435 (2006).

the new district did not pose any VRA problems.[295] In the wake of the Court's decision, the Twenty-Fifth was redrawn so that it no longer had a Hispanic majority, while the Twenty-Third was restored to close to its original contours.[296]

To assess the districts at issue in *LULAC*, I carried out yet another version of my original factor analysis, this time only for Census tracts in Texas that are at least forty percent Hispanic. This analysis generated more accurate information about the factors that account for Texan Hispanics' specific residential patterns. The factors that emerged are quite similar to those for the nation's Hispanic population as a whole. Urban/suburban location and socioeconomic status remain highly significant, while employment in construction is somewhat more important and age is somewhat less so.[297]

Table 13 in the Appendix lists the spatial diversity scores for the Hispanic populations in all of Texas's majority-Hispanic districts at the time that *LULAC* was decided, as well as in the original and final versions of the Twenty-Third District.[298] These scores are also displayed in Figure 21. As the table and the chart show, the Hispanic residents of the new Twenty-Fifth District were indeed highly heterogeneous. They were, in fact, the *most* heterogeneous of any of the Hispanic populations contained by Texas's majority-Hispanic districts, thanks to their particularly high variation along the urban/suburban factor. The original Twenty-Third District, in contrast, contained a somewhat more homogeneous Hispanic population, placing third in spatial diversity among the nine districts that I analyzed. Its lower overall heterogeneity was attributable to its lower variations for urban/suburban location and employment in construction. Lastly, the current version of the Twenty-Third District is more uniform still, ranking fourth (and essentially tied for sixth) among the nine districts. The main reason for the improvement is the district's substantially lower variation along the Hispanic factor. The current Twenty-Third, that is, contains Census tracts that are more consistently *heavily* (i.e., well above forty percent) Hispanic.

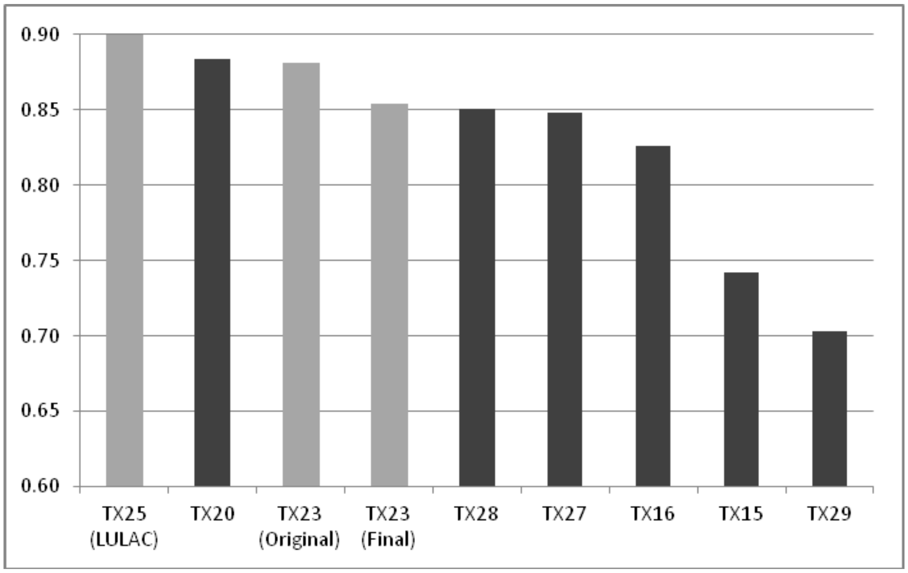
[295] *See id.* at 501 (Roberts, C.J., concurring in part, concurring in the judgment in part, and dissenting in part) ("What is blushingly ironic is that the district preferred by the majority — former District 23 — suffers from the same 'flaw' the majority ascribes to District 25, except to a greater degree.").

[296] *See* League of United Latin Am. Citizens (LULAC) v. Perry, 457 F. Supp. 2d 716, 720–21 (E.D. Tex. 2006) (three-judge court).

[297] *See infra* app. tbl.12.

[298] *See infra* app. tbl.13. The Twenty-Third District was not majority-Hispanic when *LULAC* was decided, but both its original and final versions did have Hispanic majorities. *See LULAC*, 548 U.S. at 427; *LULAC*, 457 F. Supp. 2d at 721. I consider only districts with Hispanic majorities (in terms of citizen voting-age population) because they are the only ones that the Court took into account in *LULAC*. *See LULAC*, 548 U.S. at 428–30.

FIGURE 21: SPATIAL DIVERSITY SCORES FOR HISPANIC POPULATIONS IN TEXAS MAJORITY-HISPANIC CONGRESSIONAL DISTRICTS



On their face, these results appear to favor the *LULAC* majority over Chief Justice Roberts. The Hispanic population of the old Twenty-Third District was in fact more spatially homogeneous than that of the new Twenty-Fifth District. (And, as the current version of the Twenty-Third reveals, a few additional tweaks were able to increase the population's uniformity even further.) The maps in Figures 22 and 23 depict urban/suburban location, the factor along which the two districts' Hispanic populations diverged most in their levels of geographic variation. The old Twenty-Third was relatively homogeneous along this dimension because it united mostly rural (and poor[299]) Hispanics across southwestern Texas. In contrast, the new Twenty-Fifth was relatively heterogeneous because it merged an urban Hispanic community in Austin with less densely populated (and less affluent) Hispanic areas stretching all the way to the Mexican border. As even Chief Justice Roberts acknowledged, the new Twenty-Fifth

[299] Interestingly, Texan Hispanics who are married homeowners tend to be poorer than their counterparts who are unmarried apartment-dwellers. *See infra* app. tbl.12 (showing negative loading for median household income for urban/suburban factor). The opposite relationship holds in the general population. *See infra* app. tbl.1.

"span[ned] *colonias* in Hidalgo County and suburban areas in Central Texas."[300]

On the other hand, it is not easy to see why the differences between these districts were dispositive for section 2 purposes. The new Twenty-Fifth's Hispanic residents may have been more spatially heterogeneous overall than the old Twenty-Third's, but they were only slightly more so. The old Twenty-Third's Hispanic population was still the third most spatially varied in the state, and it was actually more diverse than the new Twenty-Fifth's along five of the seven composite factors.[301] Accordingly, even if Chief Justice Roberts was wrong to claim that the old Twenty-Third was a *more* problematic district than the new Twenty-Fifth, he was probably correct in his more nuanced argument that the districts were legally indistinguishable.[302] It seems that either both districts should have been deemed valid section 2 remedies, or neither should have been.[303]

If constituencies whose minority residents are more spatially heterogeneous than the Hispanics in the new Twenty-Fifth District are not cognizable under section 2, there may be significant nationwide consequences. The Hispanic population of the new Twenty-Fifth ranked ninth in geographic variation out of the country's heavily Hispanic districts,[304] which implies that the eight districts whose Hispanic residents are still more spatially varied might not "count" under the VRA. In other words, those eight districts — along with the thirteen districts containing similarly heterogeneous African American populations[305] — might be relevant neither to a plaintiff's case that vote dilution has occurred, nor to a state's defense that the dilution already has been remedied. If this is in fact the correct reading of *LULAC*, then the scope of section 2 would be markedly narrowed. The provision would apply only to minority populations that are more spatially

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[300] *LULAC*, 548 U.S. at 499 (Roberts, C.J., concurring in part, concurring in the judgment in part, and dissenting in part) (quoting Session v. Perry, 293 F. Supp. 2d 451, 503 (E.D. Tex. 2004)).

[301] *See infra* app. tbl.13. Even the current version of the Twenty-Third has a Hispanic population that is more spatially heterogeneous than average compared to its peers around the country. *See infra* app. tbl.11.

[302] *See LULAC*, 548 U.S. at 507, 511 (Roberts, C.J., concurring in part, concurring in the judgment in part, and dissenting in part).

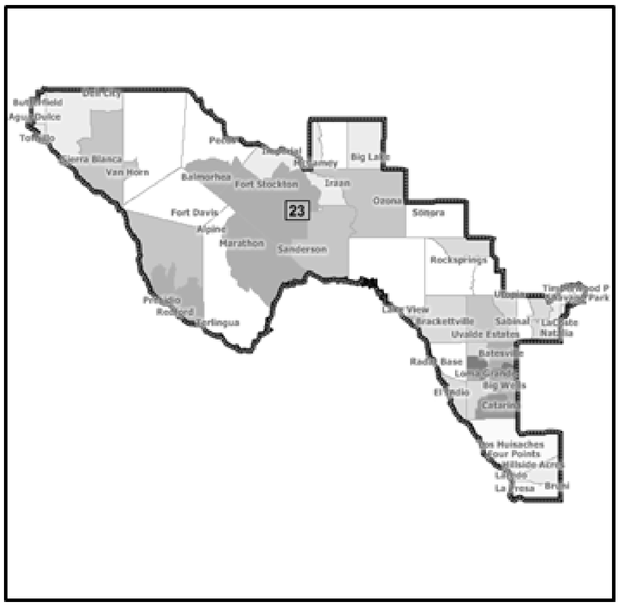
[303] *LULAC* also involved a political gerrymandering challenge to Texas's entire statewide plan. *See id.* at 413–14 (majority opinion); *id.* at 414–23 (opinion of Kennedy, J.). As measured by the average spatial diversity of its districts, the plan was quite problematic, ranking seventh in the country overall, and third among the states with ten or more districts. *See infra* app. tbl.5. Had it been available at the time, this information might have weighed in favor of the invalidation of the plan on constitutional grounds.

[304] Specifically, the Hispanic population of the new Twenty-Fifth District had a spatial diversity score of 0.78. *See infra* app. tbl.11 (listing spatial diversity scores of current heavily Hispanic districts).

[305] *See infra* app. tbl.10 (listing spatial diversity scores of current heavily African American districts).

homogeneous than the Hispanics in the new Twenty-Fifth District, thus potentially stripping about twenty current congressional districts of their statutory protection.[306] However, since it is uncertain how broadly *LULAC* was meant to sweep,[307] the fate of these constituencies (and their successors in the next redistricting cycle) will have to await further judicial clarification.

FIGURE 22: URBAN/SUBURBAN MAP FOR TEXAS'S OLD TWENTY-THIRD DISTRICT (HISPANIC TRACTS ONLY)



[306] *See* Pildes, *supra* note 145, at 1146 (noting that *LULAC* might eliminate states' "VRA obligations to create districts that, for example, bring together urban and rural minorities, or suburban and city ones").

[307] *See LULAC*, 548 U.S. at 435 (emphasizing that it is not only the Hispanic population's spatial heterogeneity, but also the "enormous geographical distance separating the Austin and Mexican-border communities," that "renders District 25 noncompact for § 2 purposes").

FIGURE 23: URBAN/SUBURBAN MAP FOR TEXAS'S NEW TWENTY-FIFTH DISTRICT (HISPANIC TRACTS ONLY)

CONCLUSION

Scholars tend to think instrumentally about districts. They focus on the implications of different districting schemes for partisan fairness, electoral competition, and minority representation. These are important issues, to be sure, but they neglect what one might call the *intrinsic* aspects of constituencies: how well they correspond to geographic communities, how willing their voters are to engage in the political process, and how suitable a forum they provide for sound representation. This Article is part of a larger project that aims to take districts themselves seriously (and not just their electoral consequences).[308] The concept that the Article introduces, spatial diversity, shifts the spotlight from utilitarian considerations onto districts' actual complexions. It stresses not how districts perform politically but rath-er how they are constituted internally. It is this change in emphasis — not any of my specific claims about spatially diverse districts — that I consider to be the Article's principal contribution. What districts are *like* is as meaningful as who they *elect*.

[308] *See generally* Stephanopoulos, *supra* note 10; Stephanopoulos, *supra* note 173. In future work, I also hope to apply the concept of spatial diversity to geographically defined entities *other* than districts, e.g., political subdivisions such as towns and counties.

It is not beyond dispute, of course, that spatial homogeneity is an unalloyed democratic good. Perhaps citizens deliberate more productively when they find themselves in geographically varied environments. Perhaps elected officials are better able to transcend parochial local interests when their constituents are spatially diverse. And perhaps legislatures function more effectively when they are less pluralistic and more oriented along a single partisan axis. I have my doubts about these arguments — which fly in the face of considerable empirical evidence — but they at least are claims about self-government, not electoral advantage. They recognize that district boundaries implicate not only the allocation of legislative power, but also the character of participation and representation. This insight is often overlooked in the decennial frenzy over redistricting, but it is vital that it not be forgotten. When we redraw district lines, we do more than pick political winners and losers. We forge the very core of our democracy.

APPENDIX

TABLE 1 †

RESULTS OF NATIONWIDE FACTOR ANALYSIS

	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *Urban/ Suburban Location*	FACTOR 3 *Hispanic*	FACTOR 4 *African American*	FACTOR 5 *Asian American*	FACTOR 6 *White Ethnic*	FACTOR 7 *Age*	FACTOR 8 *Agrarian*
VARIANCE EXPLAINED	14.6%	11.8%	10.1%	7.8%	5.0%	4.0%	3.9%	3.7%
INCOME								
Household Income < $15K %	-0.46	-0.58						
Household Income > $150K %	0.81							
Median Household Income	0.77	0.52						
Under Poverty Level %	-0.45	-0.55						
Unemployment %				-0.41				
EDUCATION								
Grad. Degree %	0.87							
> HS Grad. %	0.61		-0.51					
> Bach. Degree %	0.93							
OCCUPATION/ INDUSTRY								
Occupation — Professional %	0.89							
Occupation — Service %	-0.43	-0.42						
Occupation — Sales %								0.66
Occupation — Farm/Fish %								-0.65
Occupation — Construction %	-0.53							
Occupation — Production %	-0.75							
Industry — Agriculture %								-0.73
Industry — Construction %			0.42					
Industry — Manufacturing %	-0.43							
Industry — Wholesale Trade %								
Industry — Retail Trade %								0.45

† 62,919 Census tracts incorporated into factor analysis.
8 retained factors explain 60.9% of variance in data.
Only loadings greater than 0.4 or less than -0.4 displayed.
All variables displayed.

TABLE 1 (*continued*)

	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *Urban/ Suburban Location*	FACTOR 3 *Hispanic*	FACTOR 4 *African American*	FACTOR 5 *Asian American*	FACTOR 6 *White Ethnic*	FACTOR 7 *Age*	FACTOR 8 *Agrarian*
Industry — Transportation %								
Industry — Information %	0.42							
Industry — Finance/ Real Estate %	0.58							
Industry — Professional %	0.66							
Industry — Education/Health %								
Industry — Entertainment/ Hotel/Food %		-0.47						
Industry — Other Services %								
Industry — Public Admin. %								
HOUSEHOLD								
Married Household %		0.85						
Nonfamily Household %		-0.84						
Avg. Household Size		0.47	0.60					
HOUSING								
Housing Vacancy %								
Detached 1-Unit %		0.75						
20+ Unit %		-0.60						
Housing Built After 2000 %								
Housing Built 1950–1970 %								
Housing Built Before 1950 %						0.48		
Median Rooms		0.77						
Owner-Occupied %		0.87						
Renter-Occupied %		-0.87						
Median House Value	0.71							
Median Rent	0.65							
RACE								
Asian %					0.92			
Asian Indian %								
Chinese %					0.57			
Filipino %					0.59			
Japanese %					0.54			
Korean %								
Vietnamese %								
Other Asian %					0.45			

TABLE 1 (*continued*)

	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *Urban/Suburban Location*	FACTOR 3 *Hispanic*	FACTOR 4 *African American*	FACTOR 5 *Asian American*	FACTOR 6 *White Ethnic*	FACTOR 7 *Age*	FACTOR 8 *Agrarian*
White %				0.82				
Black %				-0.85				
Am. Indian %								
Hawaiian %								
Hispanic %			0.89					
Mexican %			0.72					
Puerto Rican %								
Cuban %								
Other Hispanic %			0.65					
Other Race %			0.81					
ETHNICITY								
American %								
Arab %								
Czech %								
Danish %								
Dutch %								
English %				0.45				
French %								
French Canadian %								
German %				0.56				
Greek %								
Hungarian %								
Irish %				0.46				
Italian %								
Lithuanian %								
Norwegian %								
Polish %						0.44		
Portuguese %								
Russian %	0.48							
Scotch-Irish %								
Scottish %								
Slovak %								
Sub-Saharan African %								
Swedish %								
Swiss %								
Ukrainian %								

TABLE 1 (*continued*)

	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *Urban/ Suburban Location*	FACTOR 3 *Hispanic*	FACTOR 4 *African American*	FACTOR 5 *Asian American*	FACTOR 6 *White Ethnic*	FACTOR 7 *Age*	FACTOR 8 *Agrarian*
Welsh %								
West Indian %								
AGE								
Median Age							0.71	
< 18 %							-0.49	
> 65 %							0.65	
OTHER								
Veteran %			-0.43					
Moved Last Year %		-0.60						
Born in State %	-0.41							
Foreign-Born %			0.77					
Public Transit Commute %				-0.44				
Mean Commute Time								
Population Density								

TABLE 2†

2008 ROLL-OFF RATE REGRESSIONS

VARIABLES	MODEL 1 *Spatial Diversity and Other Relevant Variables*	MODEL 2 *Spatial Diversity and Top-Line Diversity*	MODEL 3 *Spatial Diversity and All Controls*
Spatial Diversity	0.11 (0.03)***	0.17 (0.03)***	0.10 (0.04)**
High School Grad. %	-0.0003 (0.0005)		-0.0003 (0.0005)
Bachelor's Degree %	-0.0005 (0.0005)		-0.0005 (0.0005)
Graduate Degree	0.001 (0.0008)		0.001 (0.0008)
Income	0.0000008 (0.0000003)**		0.0000007 (0.0000003)**
Average Age	0.003 (0.0009)***		0.003 (0.0009)***
White %	-0.0009 (0.0007)		-0.0006 (0.0007)
Black %	-0.001 (0.0007)*		-0.001 (0.0007)*
Hispanic %	-0.0002 (0.0002)		-0.0003 (0.0003)
Asian %	-0.0005 (0.0008)		-0.0004 (0.0008)
2008 Margin	0.06 (0.02)***		0.06 (0.02)***
Sullivan Index		-0.10 (0.09)	0.11 (0.16)
Constant	-0.07 (0.09)	0.007 (0.03)	-0.13 (0.13)
Observations	345	345	345
Adjusted R-Squared	0.28	0.15	0.28

† Districts with uncontested or extremely uncompetitive races omitted.
Alabama, Illinois, and Massachusetts districts omitted due to unreliable data.
Entries for variables take form: coefficient (standard error).
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

TABLE 3†

2005–2011 DW-NOMINATE SCORE REGRESSIONS

VARIABLES	MODEL 1 *District Attributes* *50 Most Spatially Diverse Districts*	MODEL 2 *District Attributes* *50 Least Spatially Diverse Districts*	MODEL 3 *Cook PVI* *50 Most Spatially Diverse Districts*	MODEL 4 *Cook PVI* *50 Least Spatially Diverse District*
Factor 1 Avg.	-0.18 (0.36)	-0.45 (0.60)		
Factor 2 Avg.	-0.35 (0.62)	-0.63 (1.17)		
Factor 3 Avg.	0.04 (0.31)	0.92 (0.92)		
Factor 4 Avg.	0.91 (0.35)**	-1.49 (0.58)**		
Factor 5 Avg.	-0.04 (0.28)	2.89 (1.60)		
Factor 6 Avg.	-0.33 (0.39)	1.19 (0.36)***		
Factor 7 Avg.	0.24 (0.45)	-0.29 (0.64)		
Factor 8 Avg.	0.21 (0.34)	0.17 (0.64)		
Factor 1 Avg. x Factor 1 Var.	0.24 (0.32)	1.40 (0.97)		
Factor 2 Avg. x Factor 2 Var.	0.51 (0.61)	0.19 (1.77)		
Factor 3 Avg. x Factor 3 Var.	0.004 (0.24)	-2.64 (2.06)		
Factor 4 Avg. x Factor 4 Var.	-0.61 (0.29)**	1.71 (0.99)*		
Factor 5 Avg. x Factor 5 Var.	0.02 (0.14)	-4.08 (3.38)		
Factor 6 Avg. x Factor 6 Var.	0.38 (0.72)	-1.74 (0.66)**		
Factor 7 Avg. x Factor 7 Var.	-0.05 (0.45)	0.60 (0.63)		
Factor 8 Avg. x Factor 8 Var.	0.06 (0.19)	0.20 (0.77)		
Cook PVI			0.03 (0.02)*	-0.06 (0.08)
Cook PVI x Spatial Diversity			-0.01 (0.02)	0.17 (0.17)
Sullivan Index	0.48 (3.84)	-4.40 (6.54)	-0.17 (1.19)	-1.06 (2.68)
Constant	-0.57 (2.19)	3.34 (3.61)	0.17 (0.70)	0.55 (1.29)
Observations	50	50	50	50
Adjusted R-Squared	0.16	0.47	0.56	0.28

† Entries for variables take form: coefficient (standard error).
*** p < 0.01, ** p < 0.05, * p < 0.1

TABLE 4[†]

SPATIAL DIVERSITY SCORES FOR SELECTED CONGRESSIONAL DISTRICTS

RANK	DISTRICT	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *Urban/ Suburban Location*	FACTOR 3 *Hispanic*	FACTOR 4 *African American*	FACTOR 5 *Asian American*	FACTOR 6 *White Ethnic*	FACTOR 7 *Age*	FACTOR 8 *Agrarian*	OVERALL
1	IL07	1.45	1.01	1.09	1.55	1.22	0.55	0.89	0.71	1.16
2	NY08	1.64	1.02	0.60	0.59	1.67	0.72	1.09	0.80	1.07
3	CA08	1.21	1.22	0.66	0.74	2.24	0.39	0.87	0.47	1.03
4	NY05	0.91	1.07	1.48	0.42	2.14	0.45	0.91	0.57	1.02
5	CA09	1.31	1.18	1.04	0.64	1.39	0.37	0.59	0.77	1.02
6	NY12	1.09	0.80	1.13	0.81	2.25	0.49	0.77	0.70	1.02
7	CA33	1.03	0.99	1.24	0.99	1.66	0.45	0.62	0.49	1.01
8	TX32	1.38	1.13	1.36	0.40	0.74	0.46	0.67	0.51	0.99
9	GA05	1.37	1.01	0.79	1.40	0.57	0.44	0.63	0.68	0.99
10	CA36	1.19	1.06	1.15	0.43	1.82	0.37	0.72	0.53	0.99
11	CA28	1.26	1.16	1.44	0.39	0.81	0.42	0.72	0.45	0.98
12	MI13	0.81	0.90	1.19	1.52	0.86	0.63	0.83	0.81	0.97
13	MA08	1.12	0.93	0.93	1.19	1.15	0.40	0.68	0.82	0.97
14	TX30	0.94	1.07	1.52	1.17	0.39	0.44	0.66	0.52	0.97
15	MD08	1.23	1.13	1.11	0.51	0.93	0.39	0.91	0.63	0.96
16	CA17	0.78	0.97	1.41	0.38	0.83	0.49	0.86	2.37	0.96
17	FL18	1.13	1.09	1.26	0.64	0.38	0.50	1.26	0.59	0.95
18	CA23	0.80	1.13	1.28	0.44	0.71	0.52	0.96	1.86	0.95
19	CA53	1.06	1.16	1.05	0.60	1.17	0.41	0.77	0.62	0.94
20	NJ13	1.17	0.75	1.20	0.77	1.11	0.60	0.76	0.58	0.94
21	MD07	1.18	1.17	0.52	1.30	0.65	0.52	0.75	0.58	0.93
22	CT04	1.42	1.18	0.74	0.61	0.58	0.55	0.70	0.49	0.93
23	CO01	1.10	1.10	1.20	0.72	0.56	0.39	0.73	0.58	0.92
24	HI01	0.81	1.31	0.61	0.52	2.12	0.60	0.85	0.62	0.92
25	CA46	0.96	1.05	0.91	0.45	1.98	0.36	0.94	0.51	0.92
26	CA37	0.74	1.07	1.06	0.81	1.62	0.55	0.85	0.52	0.92
27	CA14	1.11	1.02	0.84	0.43	1.81	0.47	0.53	0.75	0.92
28	IL05	1.25	1.05	0.98	0.39	0.94	0.45	0.84	0.57	0.91
29	NY17	0.71	1.12	1.03	1.24	0.58	0.59	1.07	0.64	0.91

† Table includes 50 most spatially diverse districts, 50 least spatially diverse districts, and districts that rate highest and lowest on each individual factor.

TABLE 4 (*continued*)

RANK	DISTRICT	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *Urban/ Suburban Location*	FACTOR 3 *Hispanic*	FACTOR 4 *African American*	FACTOR 5 *Asian American*	FACTOR 6 *White Ethnic*	FACTOR 7 *Age*	FACTOR 8 *Agrarian*	OVERALL
30	NJ08	1.16	0.93	1.16	0.69	0.70	0.48	0.58	0.66	0.91
31	CA16	0.98	1.05	0.96	0.41	1.81	0.41	0.66	0.53	0.90
32	NJ10	0.94	0.91	1.04	1.14	0.75	0.55	0.70	0.57	0.90
33	TX25	1.01	1.28	1.05	0.54	0.40	0.60	0.73	0.70	0.90
34	GA04	0.74	0.84	1.39	1.39	0.64	0.43	0.56	0.51	0.90
35	MD04	0.85	1.00	1.06	1.12	0.76	0.48	0.80	0.51	0.89
36	TX07	1.13	1.28	0.89	0.53	0.64	0.37	0.66	0.66	0.89
37	PA02	1.02	0.97	0.47	1.47	0.84	0.51	0.76	0.71	0.89
38	MA05	1.17	0.98	1.00	0.34	1.14	0.51	0.67	0.68	0.89
39	TX09	0.72	1.16	1.15	0.91	1.02	0.40	0.63	0.60	0.89
40	TX18	0.85	0.92	1.17	1.20	0.56	0.44	0.66	0.67	0.89
41	PA01	0.78	0.70	1.02	1.36	1.03	0.71	0.73	0.69	0.89
42	NY18	1.20	1.09	0.91	0.53	0.62	0.54	0.75	0.55	0.89
43	OH11	1.02	1.02	0.43	1.32	0.57	0.69	0.91	0.79	0.88
44	LA02	0.90	1.04	0.62	1.16	0.89	0.47	0.90	0.80	0.88
45	CA35	0.84	0.69	1.31	0.79	1.29	0.60	0.72	0.55	0.88
46	NJ06	0.85	1.06	0.80	0.75	1.35	0.50	0.90	0.62	0.88
47	WI04	0.66	0.88	0.99	1.44	0.76	0.60	0.86	0.62	0.87
48	CA31	0.84	0.90	1.20	0.33	1.37	0.65	0.99	0.53	0.87
49	WA07	1.02	1.28	0.40	0.69	1.50	0.36	0.59	0.57	0.87
50	CA15	0.95	0.96	0.59	0.42	2.25	0.48	0.53	0.78	0.87
51	NY15	1.22	0.31	1.42	0.87	0.59	0.55	0.62	0.68	0.86
58	IL01	0.69	1.00	0.69	1.65	0.38	0.54	0.74	0.86	0.85
63	HI02	0.68	0.75	0.60	0.61	2.84	0.47	0.62	0.64	0.83
65	CA30	0.77	1.62	0.44	0.51	1.04	0.44	0.64	0.57	0.83
85	CA20	0.47	0.68	1.03	0.39	0.96	0.55	0.67	2.93	0.80
109	FL19	0.82	0.81	0.83	0.54	0.51	0.42	1.69	0.45	0.77
325	CA43	0.60	0.78	0.75	0.43	0.54	0.35	0.44	0.47	0.60
330	PA11	0.49	0.83	0.44	0.58	0.33	0.95	0.65	0.64	0.59
341	GA07	0.75	0.75	0.51	0.45	0.65	0.23	0.49	0.31	0.59
364	TX15	0.57	0.54	0.81	0.33	0.23	0.40	0.84	0.87	0.57
386	PA18	0.72	0.69	0.25	0.45	0.34	0.52	0.54	0.48	0.53
387	IN06	0.53	0.84	0.32	0.41	0.37	0.48	0.58	0.56	0.53
388	GA03	0.70	0.70	0.31	0.49	0.30	0.41	0.50	0.47	0.53
389	MN06	0.63	0.89	0.27	0.31	0.39	0.33	0.58	0.47	0.53
390	WI08	0.52	0.71	0.28	0.38	0.41	0.60	0.87	0.67	0.53
391	MO02	0.82	0.72	0.24	0.28	0.38	0.30	0.58	0.43	0.53

TABLE 4 (*continued*)

RANK	DISTRICT	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *Urban/ Suburban Location*	FACTOR 3 *Hispanic*	FACTOR 4 *African American*	FACTOR 5 *Asian American*	FACTOR 6 *White Ethnic*	FACTOR 7 *Age*	FACTOR 8 *Agrarian*	OVERALL
392	ME01	0.59	0.84	0.23	0.31	0.34	0.40	0.63	0.78	0.52
393	WI03	0.50	0.90	0.25	0.26	0.33	0.46	0.70	0.88	0.52
394	PA10	0.57	0.61	0.33	0.33	0.36	0.77	0.66	0.80	0.52
395	MO04	0.50	0.69	0.33	0.37	0.37	0.59	0.81	0.75	0.52
396	TN06	0.61	0.78	0.31	0.30	0.31	0.45	0.59	0.64	0.52
397	MI02	0.46	0.65	0.40	0.49	0.40	0.42	0.82	0.67	0.52
398	WI05	0.77	0.77	0.20	0.35	0.34	0.32	0.51	0.43	0.52
399	LA03	0.49	0.53	0.37	0.76	0.32	0.44	0.62	0.70	0.52
400	WV02	0.67	0.60	0.31	0.36	0.37	0.46	0.60	0.73	0.52
401	NY26	0.67	0.71	0.21	0.35	0.37	0.48	0.53	0.62	0.51
402	IL19	0.61	0.64	0.23	0.48	0.35	0.50	0.62	0.68	0.51
403	OH16	0.63	0.72	0.27	0.38	0.32	0.37	0.58	0.63	0.51
404	ME02	0.48	0.75	0.27	0.33	0.42	0.44	0.66	0.94	0.51
405	IN08	0.51	0.81	0.28	0.35	0.29	0.46	0.61	0.65	0.50
406	VT01	0.61	0.78	0.23	0.25	0.32	0.44	0.68	0.60	0.50
407	FL05	0.55	0.45	0.49	0.31	0.30	0.42	1.12	0.62	0.50
408	KY02	0.51	0.79	0.32	0.33	0.29	0.46	0.59	0.66	0.50
409	IA05	0.44	0.57	0.38	0.36	0.40	0.49	0.72	1.07	0.50
410	PA03	0.52	0.79	0.25	0.36	0.27	0.48	0.70	0.58	0.50
411	MI10	0.54	0.70	0.30	0.31	0.40	0.44	0.59	0.73	0.50
412	TN04	0.69	0.47	0.28	0.34	0.36	0.55	0.65	0.72	0.50
413	NC11	0.54	0.62	0.33	0.38	0.32	0.56	0.73	0.51	0.49
414	KY01	0.44	0.66	0.30	0.44	0.30	0.57	0.70	0.77	0.49
415	MI01	0.44	0.71	0.24	0.39	0.30	0.63	0.84	0.63	0.49
416	WI07	0.40	0.71	0.22	0.27	0.49	0.71	0.75	0.83	0.49
417	NY20	0.62	0.61	0.25	0.38	0.30	0.46	0.60	0.65	0.49
418	NC10	0.57	0.54	0.33	0.41	0.50	0.52	0.51	0.55	0.49
419	MN08	0.45	0.77	0.28	0.32	0.25	0.49	0.83	0.58	0.49
420	WV03	0.42	0.64	0.30	0.46	0.23	0.46	0.66	1.02	0.49
421	MN07	0.36	0.68	0.25	0.49	0.32	0.63	0.72	0.80	0.48
422	WI01	0.48	0.76	0.30	0.39	0.28	0.45	0.54	0.52	0.48
423	MO08	0.45	0.64	0.27	0.41	0.28	0.52	0.71	0.78	0.48
424	PA12	0.46	0.70	0.24	0.34	0.29	0.68	0.59	0.67	0.48
425	OH05	0.56	0.73	0.29	0.24	0.31	0.39	0.48	0.65	0.48
426	WI06	0.44	0.74	0.24	0.28	0.45	0.47	0.70	0.58	0.47
427	NY16	0.31	0.36	0.79	0.52	0.46	0.42	0.57	0.48	0.47
428	OK02	0.37	0.60	0.27	0.43	0.47	0.46	0.74	0.81	0.47

TABLE 4 (*continued*)

RANK	DISTRICT	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *Urban/ Suburban Location*	FACTOR 3 *Hispanic*	FACTOR 4 *African American*	FACTOR 5 *Asian American*	FACTOR 6 *White Ethnic*	FACTOR 7 *Age*	FACTOR 8 *Agrarian*	OVERALL
429	OH04	0.44	0.72	0.24	0.41	0.37	0.51	0.59	0.52	0.47
430	OH18	0.44	0.64	0.33	0.35	0.34	0.49	0.62	0.63	0.47
431	TN01	0.52	0.62	0.26	0.31	0.31	0.59	0.49	0.56	0.46
432	NY23	0.44	0.63	0.24	0.38	0.27	0.52	0.66	0.69	0.46
433	AL04	0.47	0.48	0.39	0.46	0.31	0.48	0.56	0.55	0.46
434	KY05	0.41	0.46	0.28	0.51	0.28	0.52	0.61	0.88	0.45
435	PA09	0.40	0.60	0.27	0.29	0.27	0.54	0.51	0.67	0.42

TABLE 5

AVERAGE SPATIAL DIVERSITY SCORES OF DISTRICTS WITHIN EACH STATE

RANK	STATE	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *Urban/ Suburban Location*	FACTOR 3 *Hispanic*	FACTOR 4 *African American*	FACTOR 5 *Asian American*	FACTOR 6 *White Ethnic*	FACTOR 7 *Age*	FACTOR 8 *Agrarian*	OVERALL
1	HAW.	0.75	1.03	0.60	0.56	2.48	0.53	0.74	0.63	0.88
2	CAL.	0.81	0.89	0.89	0.46	1.28	0.44	0.76	0.85	0.81
3	MD.	0.91	0.95	0.59	0.87	0.59	0.51	0.70	0.55	0.77
4	N.J.	0.87	0.84	0.70	0.67	0.92	0.48	0.78	0.64	0.77
5	CONN.	0.92	1.03	0.59	0.63	0.53	0.51	0.66	0.57	0.75
6	N.M.	0.76	0.75	0.92	0.64	0.52	0.42	0.85	0.94	0.74
7	TEX.	0.83	0.89	0.83	0.56	0.49	0.42	0.76	0.70	0.74
8	N.Y.	0.78	0.82	0.64	0.69	0.86	0.50	0.71	0.65	0.73
9	MASS.	0.93	0.93	0.55	0.51	0.70	0.48	0.62	0.68	0.73
10	ILL.	0.83	0.86	0.64	0.68	0.61	0.46	0.74	0.61	0.72
11	R.I.	0.76	0.91	0.88	0.46	0.46	0.55	0.66	0.70	0.72
12	ARIZ.	0.69	0.87	0.81	0.54	0.45	0.46	1.08	0.69	0.72
13	NEV.	0.67	0.93	0.82	0.44	0.74	0.44	0.82	0.65	0.72
14	ALASKA	0.67	0.84	0.35	0.81	1.07	0.49	0.65	1.02	0.71
15	COLO.	0.82	0.93	0.68	0.45	0.48	0.42	0.75	0.67	0.70
16	FLA.	0.73	0.81	0.69	0.65	0.41	0.41	1.04	0.76	0.70
17	GA.	0.78	0.83	0.59	0.72	0.43	0.48	0.64	0.66	0.69
18	WASH.	0.69	0.94	0.48	0.41	0.82	0.48	0.70	0.87	0.68
19	VA.	0.83	0.86	0.44	0.57	0.58	0.45	0.69	0.59	0.67
20	DEL.	0.76	0.81	0.44	0.73	0.38	0.62	0.84	0.59	0.67
21	UTAH	0.70	1.02	0.51	0.38	0.47	0.47	0.78	0.72	0.66
22	LA.	0.67	0.80	0.43	0.93	0.41	0.43	0.74	0.74	0.66
23	S.D.	0.51	0.79	0.31	0.80	0.40	0.73	0.93	1.40	0.65
24	KAN.	0.70	0.89	0.55	0.46	0.40	0.45	0.80	0.78	0.65
25	ALA.	0.78	0.80	0.37	0.75	0.35	0.56	0.70	0.63	0.65
26	OR.	0.69	0.90	0.49	0.34	0.59	0.42	0.73	0.90	0.64
27	MICH.	0.68	0.85	0.40	0.69	0.51	0.49	0.70	0.66	0.64
28	N.D.	0.50	0.94	0.25	0.61	0.29	0.60	0.99	1.43	0.63
29	NEB.	0.64	0.80	0.51	0.48	0.39	0.56	0.79	0.98	0.63
30	OKLA.	0.65	0.84	0.48	0.55	0.50	0.44	0.73	0.76	0.63
31	N.C.	0.74	0.79	0.45	0.58	0.40	0.55	0.66	0.66	0.63
32	MONT.	0.50	0.84	0.33	0.71	0.41	0.48	0.84	1.36	0.63

TABLE 5 (*continued*)

RANK	STATE	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *Urban/ Suburban Location*	FACTOR 3 *Hispanic*	FACTOR 4 *African American*	FACTOR 5 *Asian American*	FACTOR 6 *White Ethnic*	FACTOR 7 *Age*	FACTOR 8 *Agrarian*	OVERALL
33	PA.	0.74	0.80	0.38	0.59	0.46	0.59	0.66	0.63	0.63
34	MISS.	0.68	0.74	0.36	0.71	0.35	0.63	0.72	0.80	0.62
35	OHIO	0.73	0.88	0.31	0.63	0.40	0.49	0.67	0.61	0.62
36	IDAHO	0.61	0.82	0.47	0.34	0.42	0.46	0.84	1.24	0.62
37	S.C.	0.75	0.73	0.40	0.68	0.34	0.54	0.68	0.55	0.62
38	TENN.	0.76	0.77	0.36	0.62	0.36	0.51	0.65	0.60	0.61
39	MO.	0.72	0.81	0.33	0.58	0.39	0.46	0.69	0.67	0.61
40	ARK.	0.60	0.68	0.44	0.69	0.35	0.56	0.85	0.82	0.60
41	IND.	0.69	0.86	0.37	0.55	0.36	0.48	0.66	0.60	0.60
42	MINN.	0.67	0.86	0.31	0.45	0.56	0.41	0.70	0.62	0.59
43	IOWA	0.70	0.80	0.33	0.35	0.42	0.49	0.70	0.84	0.59
44	N.H.	0.68	0.89	0.31	0.33	0.38	0.50	0.67	0.58	0.57
45	WIS.	0.58	0.82	0.35	0.47	0.44	0.51	0.69	0.64	0.57
46	WYO.	0.52	0.75	0.38	0.45	0.35	0.48	0.73	1.14	0.57
47	KY.	0.64	0.77	0.31	0.49	0.32	0.46	0.65	0.70	0.56
48	W. VA.	0.56	0.72	0.30	0.39	0.32	0.47	0.66	0.81	0.52
49	ME.	0.53	0.79	0.25	0.32	0.38	0.42	0.64	0.86	0.52
50	VT.	0.61	0.78	0.23	0.25	0.32	0.44	0.68	0.60	0.50

TABLE 6†

RESULTS OF PENNSYLVANIA-SPECIFIC FACTOR ANALYSIS

	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *African American*	FACTOR 3 *Urban/ Suburban Location*	FACTOR 4 *Hispanic*	FACTOR 5 *Asian American*	FACTOR 6 *White Ethnic*
VARIANCE EXPLAINED	15.1%	12.9%	12.6%	8.9%	5.7%	5.3%
INCOME						
Household Income < $15K %		-0.42	-0.61			
Household Income > $150K %	0.83					
Median Household Income	0.75		0.56			
Under Poverty Level %		-0.47	-0.54			
Unemployment %		-0.55				
EDUCATION						
Grad. Degree %	0.91					
> HS Grad. %	0.58			-0.46		
> Bach. Degree %	0.94					
OCCUPATION/ INDUSTRY						
Occupation — Professional %	0.91					
Occupation — Service %	-0.46	-0.44				
Occupation — Sales %						0.54
Occupation — Farm/Fish %						-0.51
Occupation — Construction %	-0.50					
Occupation — Production %	-0.72					
Industry — Agriculture %						-0.60
Industry — Manufacturing %		0.42				
Industry — Transportation %	-0.42					
Industry — Finance/Real Estate %	0.52					
Industry — Professional %	0.63					
Industry — Entertainment/Hotel/Food %			-0.45			
HOUSEHOLD						
Married Household %		0.48	0.76			

† 3037 Census tracts incorporated into factor analysis.
6 retained factors explain 60.5% of variance in data.
Only loadings greater than 0.4 or less than -0.4 displayed.
Only variables with significant loadings displayed.

TABLE 6 (*continued*)

	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *African American*	FACTOR 3 *Urban/ Suburban Location*	FACTOR 4 *Hispanic*	FACTOR 5 *Asian American*	FACTOR 6 *White Ethnic*
Nonfamily Household %			-0.89			
Avg. Household Size			0.67	0.42		
HOUSING						
Detached 1-Unit %		0.50	0.55			
20+ Unit %			-0.60			
Housing Built Before 1950 %			-0.44			
Median Rooms			0.77			
Owner-Occupied %			0.84			
Renter-Occupied %			-0.84			
Median House Value	0.80					
Median Rent	0.67					
RACE						
Asian %					0.91	
Asian Indian %					0.62	
Chinese %					0.57	
Vietnamese %					0.48	
Other Asian %					0.58	
White %		0.91				
Black %		-0.94				
Hispanic %				0.93		
Mexican %				0.46		
Puerto Rican %				0.84		
Other Hispanic %				0.74		
Other Race %				0.87		
ETHNICITY						
American %						-0.42
English %		0.48				
German %		0.63				
Italian %						0.51
Polish %						0.52
Russian %	0.44					
Sub-Saharan African %		-0.47				
West Indian %		-0.47				
AGE						
Median Age				-0.48		
< 18 %			0.45	0.44		
> 65 %				-0.44		

TABLE 6 (*continued*)

	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *African American*	FACTOR 3 *Urban/Suburban Location*	FACTOR 4 *Hispanic*	FACTOR 5 *Asian American*	FACTOR 6 *White Ethnic*
OTHER						
Moved Last Year %			-0.64			
Born in State %	-0.45			-0.43		
Foreign-Born %					0.74	
Public Transit Commute %		-0.82				
Mean Commute Time		-0.45				
Population Density		-0.58				

TABLE 7

SPATIAL DIVERSITY SCORES FOR PENNSYLVANIA CONGRESSIONAL DISTRICTS

RANK	DISTRICT	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *African American*	FACTOR 3 *Urban/ Suburban Location*	FACTOR 4 *Hispanic*	FACTOR 5 *Asian American*	FACTOR 6 *White Ethnic*	OVERALL
1	PA01	0.92	1.34	0.90	2.02	2.02	0.69	1.25
2	PA02	1.26	1.49	1.25	0.81	1.74	0.68	1.23
3	PA14	0.99	0.96	1.11	0.40	0.86	0.84	0.89
4	PA16	0.95	0.33	0.94	1.62	0.60	1.04	0.89
5	PA06	1.24	0.38	0.97	1.23	0.72	0.52	0.89
6	PA13	1.00	0.63	0.71	0.70	1.42	0.66	0.83
7	PA07	1.12	0.56	0.84	0.43	1.43	0.59	0.82
8	PA08	1.00	0.37	0.80	0.49	1.21	0.76	0.75
9	PA15	0.66	0.33	0.85	1.42	0.61	0.55	0.73
10	PA17	0.67	0.66	0.74	0.63	0.50	0.81	0.67
11	PA11	0.53	0.45	0.92	0.72	0.52	0.99	0.66
12	PA05	0.82	0.26	1.08	0.27	0.58	0.58	0.63
13	PA04	0.98	0.37	0.76	0.36	0.43	0.55	0.62
14	PA19	0.65	0.37	0.85	0.61	0.45	0.71	0.61
15	PA18	0.76	0.38	0.73	0.30	0.71	0.49	0.58
16	PA03	0.58	0.35	0.83	0.40	0.37	0.75	0.55
17	PA10	0.62	0.28	0.67	0.35	0.36	1.17	0.54
18	PA12	0.50	0.26	0.75	0.24	0.36	0.81	0.48
19	PA09	0.44	0.25	0.66	0.33	0.37	0.88	0.46

TABLE 8[†]

RESULTS OF FACTOR ANALYSIS FOR TRACTS WITH HIGH AFRICAN-AMERICAN POPULATIONS

	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *Hispanic*	FACTOR 3 *African American*	FACTOR 4 *Urban/ Suburban Location*	FACTOR 5 *Construction*	FACTOR 6 *Age*
VARIANCE EXPLAINED	12.9%	11.2%	10.6%	10.6%	4.6%	4.5%
INCOME						
Household Income < $15K %	-0.55			-0.59		
Household Income > $150K %	0.59					
Median Household Income	0.69			0.57		
Under Poverty Level %	-0.60			-0.51		
Unemployment %	-0.40					
EDUCATION						
Grad. Degree %	0.72					
> HS Grad. %	0.69					
> Bach. Degree %	0.82					
OCCUPATION/ INDUSTRY						
Occupation — Professional %	0.75					
Occupation — Construction %					-0.58	
Occupation — Production %	-0.60					
Industry — Agriculture %						-0.43
Industry — Construction %					-0.58	
Industry — Manufacturing %	-0.48					
Industry — Finance/Real Estate %	0.43					
Industry — Education/Health %					0.55	
HOUSEHOLD						
Married Household %				0.75		
Nonfamily Household %				-0.72		
Avg. Household Size		0.41		0.50		

† 7536 Census tracts incorporated into factor analysis (all tracts > 40% African-American).
6 retained factors explain 54.2% of variance in data.
Only loadings greater than 0.4 or less than -0.4 displayed.
Only variables with significant loadings displayed.

TABLE 8 (*continued*)

	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *Hispanic*	FACTOR 3 *African American*	FACTOR 4 *Urban/ Suburban Location*	FACTOR 5 *Construction*	FACTOR 6 *Age*
HOUSING						
Detached 1-Unit %				0.62		
20+ Unit %				-0.59		
Housing Built Before 1950 %					0.58	
Median Rooms				0.77		
Owner-Occupied %				0.88		
Renter-Occupied %				-0.88		
Median House Value	0.54	0.59				
Median Rent	0.52					
RACE						
White %			0.93			
Black %			-0.91			
Hispanic %		0.83				
Puerto Rican %		0.59				
Other Hispanic %		0.75				
Other Race %		0.79				
ETHNICITY						
English %			0.63			
German %			0.70			
Irish %			0.72			
Italian %			0.45			
Scotch-Irish %			0.45			
Scottish %			0.48			
West Indian %		0.52				
AGE						
Median Age						-0.69
< 18 %						0.53
> 65 %						-0.61
OTHER						
Veteran %		-0.42				
Moved Last Year %				-0.42		
Born in State %	-0.49	-0.51				
Foreign-Born %		0.83				

TABLE 8 (*continued*)

	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *Hispanic*	FACTOR 3 *African American*	FACTOR 4 *Urban/ Suburban Location*	FACTOR 5 *Construction*	FACTOR 6 *Age*
Public Transit Commute %		0.54	-0.40			
Mean Commute Time		0.50				
Population Density		0.61				

TABLE 9[†]

RESULTS OF FACTOR ANALYSIS FOR TRACTS WITH HIGH HISPANIC POPULATIONS

	FACTOR 1 *Urban/ Suburban Location*	FACTOR 2 *Hispanic*	FACTOR 3 *Socio-Economic Status*	FACTOR 4 *Age*	FACTOR 5 *Construction*	FACTOR 6 *Manufacturing*	FACTOR 7 *Asian American*	FACTOR 8 *Agrarian*
VARIANCE EXPLAINED	13.7%	12.4%	10.7%	5.8%	5.8%	5.3%	4.5%	4.3%
INCOME								
Household Income < $15K %	0.45		-0.67					
Household Income > $150K %			0.63					
Median Household Income	-0.43		0.80					
Under Poverty Level %			-0.65					
EDUCATION								
Grad. Degree %			0.46					
> HS Grad. %		0.55	0.43					
> Bach. Degree %			0.56					
OCCUPATION/ INDUSTRY								
Occupation — Professional %			0.41		0.42			
Occupation — Service %	0.48							
Occupation — Sales %					0.40			0.41
Occupation — Farm/Fish %								-0.91
Occupation — Construction %					-0.76			
Occupation — Production %						-0.84		
Industry — Agriculture %								-0.89
Industry — Construction %					-0.78			
Industry — Manufacturing %						-0.83		
Industry — Education/Health %					0.66	0.40		
HOUSEHOLD								
Married Household %	-0.76							
Nonfamily Household %	0.59	0.50						
Average Household Size		-0.58		-0.42				

[†] 6845 Census tracts incorporated into factor analysis (all tracts > 40% Hispanic).
8 retained factors explain 62.4% of variance in data.
Only loadings greater than 0.4 or less than -0.4 displayed.
Only variables with significant loadings displayed.

TABLE 9 (*continued*)

	FACTOR 1 *Urban/ Suburban Location*	FACTOR 2 *Hispanic*	FACTOR 3 *Socio-Economic Status*	FACTOR 4 *Age*	FACTOR 5 *Construction*	FACTOR 6 *Manufacturing*	FACTOR 7 *Asian American*	FACTOR 8 *Agrarian*
HOUSING								
Detached 1-Unit %	-0.85							
20+ Unit %	0.65							
Housing Built Before 1950 %	0.49							
Median Rooms	-0.76							
Owner-Occupied %	-0.88							
Renter-Occupied %	0.88							
Median House Value			0.66					
Median Rent			0.77					
RACE								
Filipino %							0.51	
White %	-0.43			0.57				
Black %				-0.49				
Asian %			0.47				0.71	
Hispanic %		-0.76						
Mexican %	-0.45		-0.42				0.43	
Puerto Rican %	0.43						-0.46	
Cuban %				0.56				
Other Hispanic %	0.42							
Other Race %						-0.41		
ETHNICITY								
Dutch %		0.42						
English %		0.73						
French %		0.54						
German %		0.77						
Irish %		0.76						
Norwegian %		0.44						
Scotch-Irish %		0.52						
Scottish %		0.54						
Swedish %		0.48						
AGE								
Median Age				0.66				
< 18 %				-0.59				
> 65 %				0.64				

TABLE 9 (*continued*)

	FACTOR 1 *Urban/ Suburban Location*	FACTOR 2 *Hispanic*	FACTOR 3 *Socio-Economic Status*	FACTOR 4 *Age*	FACTOR 5 *Construction*	FACTOR 6 *Manufacturing*	FACTOR 7 *Asian American*	FACTOR 8 *Agrarian*
OTHER								
Veteran %		0.58						
Born in State %	-0.43				0.40			
Foreign-Born %		-0.61						
Public Transit Commute %	0.67							
Mean Commute Time			0.40					
Population Density	0.60							

TABLE 10

SPATIAL DIVERSITY SCORES FOR HEAVILY AFRICAN AMERICAN DISTRICTS (INCORPORATING ONLY HEAVILY AFRICAN AMERICAN CENSUS TRACTS)

RANK	DISTRICT	FACTOR 1 *Socio-Economic Status*	FACTOR 2 *Hispanic*	FACTOR 3 *African American*	FACTOR 4 *Urban/ Suburban Location*	FACTOR 5 *Construc-tion*	FACTOR 6 *Age*	OVERALL
1	MD04	0.91	0.85	0.74	1.24	0.55	0.59	0.87
2	OH11	0.91	0.25	1.28	0.97	0.76	0.83	0.84
3	IL01	0.96	0.57	0.78	1.10	0.66	0.84	0.83
4	PA02	0.90	0.57	1.07	0.82	0.54	1.03	0.83
5	GA05	0.92	0.60	0.80	1.03	0.76	0.70	0.82
6	LA02	0.79	0.58	0.91	0.99	0.84	0.83	0.82
7	NJ10	0.83	0.87	0.75	0.89	0.71	0.68	0.81
8	NY10	0.90	0.63	0.77	1.06	0.56	0.59	0.80
9	NC12	1.02	0.63	0.76	0.81	0.79	0.64	0.80
10	PA01	0.76	0.81	0.88	0.68	0.70	0.90	0.79
11	MD07	0.98	0.41	1.00	0.81	0.69	0.70	0.78
12	IL07	0.87	0.59	0.69	1.01	0.68	0.80	0.78
13	MI13	0.87	0.43	0.72	1.01	0.74	1.01	0.78
14	FL23	0.79	0.67	0.89	0.81	0.48	0.95	0.77
15	IL02	0.80	0.48	0.98	0.98	0.47	0.76	0.77
16	NY06	0.59	0.70	0.71	1.15	0.52	0.88	0.76
17	FL03	0.62	0.77	0.83	0.92	0.66	0.64	0.76
18	FL17	0.63	0.79	0.62	0.94	0.77	0.66	0.73
19	TN09	0.74	0.40	0.78	0.94	0.71	0.63	0.71
20	VA03	0.71	0.34	0.97	0.86	0.60	0.74	0.71
21	MS02	0.84	0.36	0.83	0.69	0.54	1.07	0.70
22	MO01	0.76	0.21	1.01	0.86	0.57	0.75	0.70
23	AL07	0.76	0.28	0.87	0.85	0.55	0.79	0.69
24	GA12	0.69	0.27	0.82	0.83	0.56	0.87	0.66
25	NY11	0.68	0.55	0.71	0.78	0.48	0.60	0.65
26	GA02	0.67	0.33	0.77	0.74	0.52	0.99	0.65
27	SC06	0.69	0.30	0.77	0.81	0.61	0.67	0.64
28	NC01	0.70	0.46	0.67	0.72	0.44	0.80	0.64
29	GA13	0.56	0.51	0.77	0.83	0.55	0.41	0.63
30	GA04	0.57	0.39	0.77	0.85	0.37	0.47	0.60
31	MI14	0.69	0.23	0.55	0.70	0.58	0.65	0.56

TABLE 11

SPATIAL DIVERSITY SCORES FOR HEAVILY HISPANIC DISTRICTS (INCORPORATING ONLY HEAVILY HISPANIC CENSUS TRACTS)

RANK	DISTRICT	FACTOR 1 *Urban/ Suburban Location*	FACTOR 2 *Hispanic*	FACTOR 3 *Socio-Economic Status*	FACTOR 4 *Age*	FACTOR 5 *Construction*	FACTOR 6 *Manufacturing*	FACTOR 7 *Asian American*	FACTOR 8 *Agrarian*	OVERALL
1	FL18	1.02	1.27	1.23	1.66	0.87	0.51	0.39	0.44	1.02
2	FL21	0.75	0.97	1.13	1.70	0.69	0.72	0.37	0.35	0.88
3	NY07	0.78	0.63	1.03	0.91	1.08	0.50	1.44	0.43	0.83
4	CA23	0.82	1.08	0.62	0.67	0.56	0.51	0.60	1.72	0.82
5	FL25	0.76	0.87	0.94	1.35	0.73	0.44	0.43	0.79	0.82
6	CA51	0.74	0.72	1.09	0.73	0.71	0.58	0.84	0.70	0.78
7	CA31	0.91	0.73	0.66	0.66	0.67	1.05	1.24	0.31	0.78
8	CA20	0.62	0.83	0.58	0.64	0.54	0.50	0.94	2.29	0.78
9	CA45	0.64	0.88	0.75	0.82	0.85	0.61	0.50	1.12	0.76
10	TX20	0.77	0.90	0.88	0.84	0.70	0.64	0.43	0.30	0.75
11	AZ07	0.72	0.94	0.74	0.78	0.74	0.46	0.48	0.79	0.74
12	CA17	0.60	0.94	0.60	0.46	0.60	0.49	0.68	1.86	0.74
13	TX18	0.71	0.74	0.75	1.04	0.80	0.67	0.55	0.45	0.73
14	CA21	0.53	0.89	0.52	0.60	0.52	0.47	0.73	2.12	0.72
15	TX16	0.75	0.79	0.95	0.78	0.63	0.52	0.45	0.40	0.72
16	TX09	1.03	0.45	0.65	0.78	1.02	0.49	0.77	0.38	0.72
17	TX23	0.50	1.04	0.89	0.65	0.56	0.66	0.45	0.61	0.71
18	NM01	0.78	0.94	0.68	0.77	0.69	0.43	0.55	0.36	0.71
19	NY12	0.60	0.71	0.69	0.87	0.80	0.73	1.10	0.36	0.71
20	CA18	0.67	0.66	0.60	0.62	0.59	0.60	0.80	1.53	0.71
21	TX27	0.57	1.11	0.81	0.57	0.65	0.49	0.38	0.53	0.70
22	TX30	0.87	0.76	0.43	0.71	1.05	0.54	0.57	0.48	0.70
23	CA44	0.63	0.66	1.00	0.71	0.62	0.81	0.51	0.34	0.69
24	CA37	0.86	0.62	0.57	0.57	0.51	0.69	1.14	0.42	0.68
25	AZ04	0.76	0.79	0.64	0.58	0.97	0.61	0.37	0.33	0.68
26	TX32	0.90	0.79	0.48	0.52	0.77	0.66	0.45	0.30	0.67
27	NJ13	0.54	0.60	0.66	1.13	0.75	0.83	0.53	0.38	0.66
28	CA32	0.62	0.70	0.65	0.45	0.68	0.66	1.12	0.38	0.65
29	CA39	0.58	0.80	0.69	0.64	0.54	0.72	0.68	0.35	0.65
30	CA28	0.94	0.67	0.54	0.47	0.63	0.53	0.67	0.28	0.65

TABLE 11 (*continued*)

RANK	DISTRICT	FACTOR 1 *Urban/ Suburban Location*	FACTOR 2 *Hispanic*	FACTOR 3 *Socio-Economic Status*	FACTOR 4 *Age*	FACTOR 5 *Construc-tion*	FACTOR 6 *Manufac-turing*	FACTOR 7 *Asian American*	FACTOR 8 *Agrarian*	OVERALL
31	CA34	0.78	0.64	0.59	0.55	0.59	0.79	0.64	0.38	0.64
32	CA43	0.65	0.66	0.87	0.56	0.58	0.66	0.48	0.31	0.64
33	CA47	0.62	0.82	0.52	0.45	0.67	0.56	0.91	0.48	0.64
34	IL04	0.63	0.76	0.59	0.56	0.60	0.86	0.57	0.32	0.63
35	TX28	0.47	0.88	0.75	0.61	0.66	0.56	0.38	0.45	0.63
36	CA27	0.91	0.59	0.59	0.47	0.62	0.44	0.69	0.27	0.63
37	CA38	0.60	0.54	0.67	0.51	0.73	0.61	0.92	0.35	0.61
38	NM02	0.45	0.82	0.55	0.49	0.59	0.47	0.45	0.87	0.59
39	TX15	0.42	0.82	0.69	0.63	0.61	0.45	0.36	0.43	0.58
40	CA35	0.52	0.46	0.48	0.56	0.65	0.86	0.90	0.42	0.57
41	TX29	0.62	0.61	0.42	0.65	0.78	0.61	0.45	0.28	0.56
42	NY15	0.27	0.75	0.72	0.74	0.51	0.51	0.54	0.38	0.56
43	NY16	0.34	0.29	0.51	0.52	0.58	0.56	0.40	0.29	0.42

TABLE 12†

RESULTS OF FACTOR ANALYSIS FOR TEXAS TRACTS WITH HIGH HISPANIC POPULATIONS

	FACTOR 1 *Hispanic*	FACTOR 2 *Urban/ Suburban Location*	FACTOR 3 *Socio-Economic Status*	FACTOR 4 *Construction*	FACTOR 5 *Asian American*	FACTOR 6 *Agrarian*	FACTOR 7 *Age*
VARIANCE EXPLAINED	14.2%	12.0%	10.2%	8.3%	5.6%	5.5%	5.2%
INCOME							
Household Income < $15K %	-0.56						
Household Income > $150K %			0.63				
Median Household Income	0.56	-0.44	0.51				
Under Poverty Level %	-0.62						
EDUCATION							
Grad. Degree %			0.74				
> HS Grad. %	0.62		0.42	0.49			
> Bach. Degree %			0.79				
OCCUPATION/ INDUSTRY							
Occupation — Professional %			0.70	0.45			
Occupation — Sales %				0.50		0.47	
Occupation — Farm/Fish %						-0.69	
Occupation — Construction %				-0.75			
Occupation — Production %			-0.52	-0.49			
Industry — Agriculture %						-0.78	
Industry — Construction %				-0.77			
Industry — Manufacturing %				-0.51			
Industry — Education/Health %				0.68			
Industry — Entertainment/Hotel/Food %		0.45					
Industry — Public Admin. %				0.49			
HOUSEHOLD							
Married Household %		-0.80					
Nonfamily Household %		0.72					
Avg. Household Size	-0.42	-0.48					-0.47

† 1541 Census tracts incorporated into factor analysis (all tracts > 40% Hispanic).
7 retained factors explain 61.0% of variance in data.
Only loadings greater than 0.4 or less than -0.4 displayed.
Only variables with significant loadings displayed.

TABLE 12 (*continued*)

	FACTOR 1 *Hispanic*	FACTOR 2 *Urban/ Suburban Location*	FACTOR 3 *Socio-Economic Status*	FACTOR 4 *Construc-tion*	FACTOR 5 *Asian American*	FACTOR 6 *Agrarian*	FACTOR 7 *Age*
HOUSING							
Housing Vacancy %						-0.48	
Detached 1-Unit %		-0.83					
20+ Unit %		0.71					
Housing Built After 2000 %							-0.50
Housing Built 1950–1970 %							0.44
Housing Built Before 1950 %							0.50
Median Rooms		-0.83					
Owner-Occupied %		-0.93					
Renter-Occupied %		0.93					
Median House Value			0.64				
Median Rent	0.42					0.47	
RACE							
Asian %					0.87		
Chinese %					0.49		
Vietnamese %					0.71		
Other Asian %					0.54		
White %			0.43		-0.41		
Black %			-0.45		0.42		
Hispanic %	-0.92						
Mexican %	-0.90						
ETHNICITY							
American %	0.42						
Dutch %	0.44						
English %	0.68						
French %	0.52						
German %	0.72						
Irish %	0.75						
Scotch-Irish %	0.51						
Scottish %	0.47						
AGE							
Median Age							0.73
< 18 %							-0.59
> 65 %							0.68
OTHER							
Veteran %	0.46			0.41			

TABLE 12 (*continued*)

	FACTOR 1 *Hispanic*	FACTOR 2 *Urban/ Suburban Location*	FACTOR 3 *Socio-Economic Status*	FACTOR 4 *Construc-tion*	FACTOR 5 *Asian American*	FACTOR 6 *Agrarian*	FACTOR 7 *Age*
Moved Last Year %		0.66					
Born in State %				0.53			
Foreign-Born %	-0.47			-0.64			
Public Transit Commute %		0.46					

TABLE 13

SPATIAL DIVERSITY SCORES FOR HISPANIC-MAJORITY TEXAS DISTRICTS (INCORPORATING ONLY HEAVILY HISPANIC CENSUS TRACTS)

RANK	DISTRICT	FACTOR 1 *Hispanic*	FACTOR 2 *Urban/ Suburban Location*	FACTOR 3 *Socio-Economic Status*	FACTOR 4 *Construc-tion*	FACTOR 5 *Asian American*	FACTOR 6 *Agrarian*	FACTOR 7 *Age*	OVERALL
1	TX25 (*LULAC*)	1.15	1.04	0.92	0.72	0.45	0.79	0.89	0.91
2	TX20	0.87	1.03	1.02	0.74	0.71	0.50	1.15	0.88
3	TX23 (ORIGINAL)	1.18	0.67	0.97	0.55	0.59	1.03	1.06	0.88
4	TX23 (FINAL)	1.01	0.64	1.02	0.58	0.64	1.10	1.03	0.85
5	TX28	1.09	0.81	0.79	0.60	0.58	0.79	1.17	0.85
6	TX27	1.17	0.76	0.95	0.57	0.42	0.76	1.00	0.85
7	TX16	0.78	0.98	1.08	0.58	0.45	0.61	1.13	0.83
8	TX15	0.94	0.54	0.90	0.68	0.42	0.64	0.91	0.74
9	TX29	0.69	0.88	0.49	0.75	0.78	0.47	0.82	0.70