

Subject: Establishing compact Congressional Districts

From: Frank Burton <[REDACTED]>

Date: Tue, 24 May 2011 01:19:59 -0700

To: Citizens Redistricting Commission <[REDACTED]>

Citizens Redistricting Commission

Commissioners:

I am submitting information about communities of interest in the East Bay area near San Francisco. I have lived in various cities in the East Bay for most of the last 30 years, in both Alameda and Contra Costa Counties. In addition to being an interested citizen, I have been active in recent months as a volunteer Regional Organizer, Greater East Bay, for MoveOn.org.

In that role, I owe no allegiance to any political party, and I've spent many months of work related to the areas currently in Congressional Districts 7, 9, 10, 11, and 13. Many of my remarks echo the testimony you received in Oakland on May 21st; some are in opposition to portions of that testimony.

1. The boundary between Contra Costa and Alameda Counties generally does not form a boundary between social, economic, or climatological communities of interest. In today's world it is an artificial, legal, political boundary, nothing more. For example, Cerrito Creek, which is the boundary between Contra Costa and Alameda Counties from its mouth on San Francisco Bay to as far east as it is discernable, is insignificant. It does not form even a slight barrier between the two counties—much of the creek was placed underground when the area was urbanized many decades ago. In today's world it is an insignificant, mostly-invisible feature. A stranger, even an observant one, does not realize that she has transitioned from one county to the other unless she notices a city limits or county line sign.

2. In contrast, the ridgeline which begins roughly in El Sobrante and extends southeastward in an unbroken line to the east of the cities (and unincorporated areas) of Richmond, El Cerrito, Kensington, Albany, Berkeley, Emeryville, Oakland, Piedmont, Alameda, and San Leandro, and ends in Castro Valley, is a significant natural boundary separating two very different communities of interest. Most of the ridgeline is in parkland or other designated open space which will never be

developed.

The cities to the west of the ridgeline share a climate which is influenced greatly by marine air from the Pacific Ocean and San Francisco Bay. They also share shopping, transportation, entertainment, and culture, along with ready access to the cultural heart of the Bay Area, the city of San Francisco. While there is a gap in Castro Valley in the ridgeline, it resumes again to the east of Hayward, Union City, Newark, and Fremont. The shared climate, social, commercial, and transportation systems of these cities near San Francisco Bay also extend north from El Sobrante through the cities of Pinole, Hercules, Rodeo, and Crockett to the Carquinez Strait, which forms another natural barrier. Residents of the bayside cities rarely travel to the cities east of the ridgeline for shopping, social contact, education, or entertainment.

The cities to the east of the ridgeline share climate, social, commercial, and transportation systems with each other. I'm speaking here of the cities of Martinez, Pittsburg, Antioch, Pleasant Hill, Concord, Clayton, Walnut Creek, Alamo, Danville, San Ramon, Dublin, Pleasanton, and Livermore. Their climate is influenced much less by the marine effect of the ocean and bay, and much more by the four-season climate of the Central Valley of California. Their residents rarely travel to the bayside cities for shopping, education, social interaction, or entertainment.

3. To the north, the Carquinez Strait, Suisun Bay, and San Joaquin River form a natural barrier equally as significant as the El Sobrante/El Cerrito/Berkeley /Oakland/San Leandro/Hayward/Fremont ridgeline. Socially, culturally, climatologically, and economically, the cities and open space north of the waters mentioned in the first sentence of this paragraph are a world apart from the bayside cities. Most of the area north of the waters is physically and culturally agricultural.

4. Another significant barrier creating separate communities of interest exists in the vast open spaces surrounding Mt. Diablo and trending southeast from it across Altamont Pass. Culturally, commercially, and socially, the cities south of the San Joaquin River and Suisun Bay and along the Interstate 680 corridor plus Livermore are vastly different from the cities of Brentwood, Stockton, Manteca, and Tracy, which are on the eastern side of the Mt. Diablo/Altamont Pass open space areas. Little agriculture remains in the I-680 corridor, in contrast to Brentwood, Stockton, Manteca, and Tracy, which are islands in a sea of agriculture.

5. How do I envision new, compact Congressional Districts being laid out? Probably two districts south of Carquinez Strait and on the bay side of the El Sobrante to Fremont ridgeline, with the boundary between the two districts placed so that it achieves the equality of population which is required. If necessary to achieve the required population level, cities like Crockett and Martinez could be included or not. And Newark, the southern portion of Fremont, and Milpitas could also be included or not, in order to reach the necessary population level.

6. Probably another two districts south of the Carquinez Strait/Suisun Bay/ San Joaquin River waters, east of the El Sobrante to Fremont ridgeline and mostly west of the Mt. Diablo to Altamont Pass and beyond open spaces. The boundary line between these two districts could be positioned so that it serves to equalize their population to the required extent. I include in this area the cities of Pittsburg and Antioch because they are more like the other cities I'll list in this group than they are like the areas north of the Carquinez/Suisun waters or like Brentwood, Stockton, and Tracy. Pittsburg and Antioch are linked to the other urban centers of the immediate San Francisco Bay Area by the Bay Area Rapid Transit (BART) system.

The bulk of the population in this corridor is in three areas commonly known as Lamorinda (Lafayette, Moraga, Orinda); the Diablo Valley (Pleasant Hill, Concord, Clayton, and Walnut Creek); and the Tri-Valley area (Alamo, Danville, San Ramon, Dublin, Pleasanton, and Livermore). The latter group has long been recognized as a community of interest—they are the principal cities in “Tri-Valley” telephone directories published by Pacific Bell/SBC/now AT&T, for decades. Wikipedia even contains a definition of the Tri-Valley area:

<http://en.wikipedia.org/wiki/Tri-Valley>

I look forward to the results of your work. I am tired of dealing with the extreme gerrymandering of the California Legislature which created such districts as CD_11, with its bizarre shape and incredible geographic, social, cultural, and economic disparity.

I will make the effort to attend another of your public hearings if there are questions you'd like to ask me.

Respectfully submitted,

Frank Burton



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Using a Density-Variation/Compactness Measure to Evaluate Redistricting Plans for Partisan Bias and Electoral Responsiveness

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Using a Density-Variation/Compactness Measure to Evaluate Redistricting Plans for Partisan Bias and Electoral Responsiveness

Thomas R. Belin, Heidi J. Fischer, and Corwin M. Zigler

Abstract

The clear association between population density and partisan preference in elections suggests that redistricting plans would be better aligned with principles of partisan fairness if there were a deliberate effort to balance population density across legislative districts. To balance population density without sacrificing geometric compactness, we define a density-variation/compactness (DVC) measure that can serve as a one-number summary of a proposed redistricting plan. After analyzing voter registration data from California to guide the choice of a specific DVC measure, we evaluate its performance in both actual and hypothetical redistricting plans using election data from Texas during the past decade. Using a well-established political-science model of the relationship between legislative representation and the proportion of votes received, higher DVC scores corresponded to estimates of partisan bias with smaller magnitude across a range of redistricting scenarios; meanwhile, contrary to expectations that reduced partisan bias would be accompanied by reduced electoral responsiveness, there was no discernible pattern between DVC scores and estimates of electoral responsiveness. Although there are apt to be multiple considerations in choosing a redistricting plan, we discuss how the use of DVC measures could provide a check on attempts to introduce partisan bias into the redistricting process.

KEYWORDS: seats-votes curve, Texas redistricting plans, Maptitude software, JudgeIt software, red-state, blue-state, DVC

Author Notes: Thomas R. Belin, UCLA Department of Biostatistics. Heidi J. Fischer, UCLA Department of Biostatistics. Corwin M. Zigler, Harvard Department of Biostatistics. This project was supported by a Research Innovation award from the UCLA School of Public Health. Our work also benefited from discussions with Bill Cumberland, Phil Ethington, and Kieran Williams as well as helpful feedback from the editors and from an anonymous referee on an earlier version of this article.

1. Introduction

Beyond the challenge of addressing confusion about standards for judging legislative redistricting plans, officials in charge of redistricting decisions operate in an environment where access to information is apt to be asymmetric. It is reasonable to expect partisan advocates to approach redistricting as a competitive game and to use all available information, including voter registration data and electoral returns, in studying how to maximize partisan advantage. At the same time, four states have laws that explicitly restrict the use of political data in the redistricting process (Levitt 2010), redistricting commissions often decline to use political data (Cox 2006), and other redistricting officials are apt to be constrained in the data they use in an effort to avoid any appearance of partisanship (e.g., Utah Office of Legislative Research and General Counsel 2001). In the face of this asymmetry, is there any realistic way to use available information to help protect against partisan bias in redistricting?

Motivated by considerations linking redistricting to principles of democracy (e.g., Grofman and King 2007), and making use of the well-known “red-state, blue-state” pattern of population density predicting partisan preference (e.g., Gaster, Shalizi, and Newman 2004), this article describes a measure based only on census data and district geography that could be used to evaluate redistricting plans while offering protection against partisan bias. The proposed “density-variation/compactness” (DVC) measure favors plans having less variation in population density across districts without sacrificing too much geometric compactness.

After exploring California voter-registration data to guide the tradeoff between density variation and compactness, we define a specific DVC measure. To illustrate its properties, we apply the measure to a range of actual and hypothetical Texas redistricting plans using Texas election results from the past decade. In the process, we obtain descriptive summaries of the proportion of districts with margins of victory of less than 10% as well as estimates of partisan bias and electoral responsiveness from a political-science model (King 1989; Gelman and King 1990, 1994; King and Gelman 1991) of the “seats-votes curve” characterizing the connection between swings in partisan preference and legislative representation (Tufte 1973, Grofman 1983). In subsequent discussion, we consider how DVC measures might be used in future decision-making about legislative redistricting, and in an appendix, we elaborate on choices made in defining a DVC measure.

2. Defining a Density-Variation/Compactness (DVC) Measure

We propose a measure of performance for evaluating redistricting plans based on two key ingredients: an aggregate summary of variation in population density across districts, and an aggregate summary of geometric compactness. Noting that there is not a unique way to summarize either geometric compactness or variation in population density, we call a measure of performance of a redistricting plan a density-variation/compactness (DVC) measure if it can be expressed as a function of (1) departures from a central value or average among district-specific demographic density measurements and (2) district-specific geometric compactness measures.

For present purposes, we use the average absolute deviation of district-specific population densities as a measure of density variation and the average of district-specific Reock measures (Reock 1961) as implemented in Maptitude 5.0 software (Caliper Corporation 2009) as a measure of compactness. Because population density is not exchangeable across jurisdictions—ranging, for example, across states from 1.1 persons per square mile in Alaska to 1,134.4 persons per square mile in New Jersey (Census Bureau, 2001)—we relate between-district variation in population density to a benchmark measure of between-district variability.

We now define a DVC measure. Suppose P candidate redistricting plans are under consideration. For a state with D districts, indexed by $d = 1, 2, \dots, D$, and redistricting plans indexed by $p = 1, 2, \dots, P$, denote the population density associated with each district in each plan as w_{pd} . Thus, the average density in a

given plan is $\bar{w}_p = \frac{1}{D} \sum_{d=1}^D w_{pd}$, and the average absolute deviation in density for

that plan is $V_p = \frac{1}{D} \sum_{d=1}^D |w_{pd} - \bar{w}_p|$. Where possible, we use the benchmark value

V_{ref} to denote the average absolute deviation in density associated with the districts used in the 2000 election in the given state. (In the case of a state with only $D = 1$ district in the year 2000, we would use the districts from the most recent previous decade when $D \geq 2$ to obtain V_{ref} ; in the event that there is no such previous decade with $D \geq 2$, we leave our proposed DVC measure undefined until such time as there is a previous decade when there were $D \geq 2$ districts.) Similarly, we use c_{pd} to denote the compactness of each district in each

plan, so that $\bar{c}_p = \frac{1}{D} \sum_{d=1}^D c_{pd}$ reflects the average compactness across the plan, and

we can also obtain the average compactness for a reference plan (i.e., the plan used for the 2000 elections), which we denote \bar{c}_{ref} .

Building on this framework, we propose the following DVC measure for plan p :

$$DVC_p = 15 \times \left[\left(\frac{V_{ref}}{V_p} \right) - 1 \right] + 5 \times \left[\left(\frac{\bar{c}_p}{\bar{c}_{ref}} \right) - 1 \right]$$

The scaling factors 15 and 5 were chosen following preliminary analysis of California voter registration data. Their ratio formalizes a decision to attach three times as much weight to the contribution of density variation as to the contribution of average compactness, and their magnitudes were meant to facilitate interpretation by mapping plausible values of density variation and compactness into a range that at the high end would resemble a grade-point scale. We defer further motivation to an appendix. For now, we note that both positive and negative values of DVC are possible, with positive contributions to DVC arising from candidate plans with less between-district variability than the reference plan and greater average compactness than the reference plan.

3. Evaluation protocol and results

3.1 Candidate redistricting plans

We began with congressional districts for the 110th Congress, which was in session at the time we initiated our evaluation efforts. It was naturally of interest to study the actual redistricting plans that emerged following the 2000 Census, with Texas having more than one. To generate additional candidate plans, we began by breaking down each congressional district from the 110th Congress into four geographic areas containing approximately equal sized populations according to the 2000 Census, which had apportioned 53 House seats to California and 32 House seats to Texas. Given the format of the voter registration data available to us from California (from the Statewide Database maintained at the University of California, Berkeley, available at <http://swdb.berkeley.edu/d00/index.html>) and the election data available to us from Texas (supplied by the Texas Legislative Council, available from <ftp://ftpgis1.tlc.state.tx.us>), we based the splits within the Maptitude software application on census block groups in California and on voter tabulation districts (VTDs) in Texas. This step yielded 212 “quarter-districts” in California and 128 “quarter-districts” in Texas. New plans were then formed by recombining these quarter-districts in new ways, four at a time; we use the term “retiling” to describe this process for generating alternative redistricting plans.

The first few districts produced in a given retiling induced constraints on the rest of the plan given the need retain contiguity among component parts within a district. We refer to alternative retiled plans using labels that describe the beginning of the process. For example, “Northwest start” refers to a plan

where the district formed in the first step incorporated the quarter-district with the largest sum of latitude and longitude. “LA flower” refers to a plan where the first steps gave rise to a compact district in central Los Angeles and several districts around it that had the appearance of flower petals. Similarly in Texas, labels for candidate plans refer to Dallas and Houston based on growing out of starting points in those cities. Time and resource constraints limited the number of plans we were able to consider.

3.2 Outcomes for evaluation

With an interest in understanding the extent to which a DVC measure could signal that a redistricting plan would be more or less responsive to voter preferences, we started with descriptive measures that would offer an indirect perspective on responsiveness. In California, where we had access to voter registration data, we calculated “registration advantage” (RA) within a given district as

$$RA = \left| \frac{(\# \text{ Democratic registered voters}) - (\# \text{ Republican registered voters})}{(\text{Total } \# \text{ voters})} \right| ,$$

expressed as a percentage. For a given redistricting plan, we calculated registration advantage in each district, and we recorded the proportion of all districts in the state where the registration advantage was less than 10%. In Texas, where we had access to election results, we calculated “margin of victory” (MOV) within a given district as

$$MOV = \left| \frac{(\# \text{ votes for Republican candidate}) - (\# \text{ votes for Democratic candidate})}{(\text{Total } \# \text{ votes})} \right|$$

again expressed as a percentage. By using absolute values, we implicitly gave equal weight to sizable differences favoring Democrats and sizable differences favoring Republicans, with the order in which the major parties appear in the formula (i.e., Democratic first or Republican first) making no difference to the result.

We also calculated associations between plan-specific DVC measures and estimates of partisan bias and electoral responsiveness from JudgeIt software (Gelman and King 2010), which fits a hierarchical model characterizing the “seats-votes curve” that relates swings in partisan preference to legislative representation (King 1989; Gelman and King 1990, 1994; King and Gelman 1991). Analyzing each of 10 redistricting plans (3 actual plans and 7 retiled plans) separately, and taking results from four statewide elections in Texas during

the past decade (2004 Presidential, 2006 Senate, 2008 Senate, 2008 Presidential) as input to JudgeIt software, we recorded the estimate of partisan bias (reflecting a departure from bipartisan symmetry) and responsiveness (reflecting the slope of the seats-votes curve) associated with each plan. We then looked at the correlation between DVC measures for plans and the corresponding estimates of partisan bias and responsiveness. This analysis was not focused on an inferential question about which plan is best according to some criterion; rather, it should be regarded as a descriptive assessment of whether the proposed DVC metric, which relies only on demographic and geographic information, has face validity in terms of being related to quantities estimated using election data that decision-makers on redistricting might reasonably wish to control (e.g., by limiting partisan bias or favoring responsiveness).

3.3 Descriptive findings from California voter registration data

Table 1 reports values of the DVC redistricting scale and its component inputs for 7 congressional-district plans. For each of 4 years of available voter registration data, Table 1 also reports the percentage of districts in each plan featuring a registration advantage of less than 10%. The featured plans include the actual 2002 district plan that remained in place through the decade, five additional candidate plans developed through retiling, and the actual year 2000 district plan, which was based on 1990 Census data and was used as a reference plan. By design, the 2000 district plan has a DVC score of 0. The DVC score of -2.92 for the 2002 districts derived from having both greater variation across districts in population density and lower average Reock compactness values than the 2000 plan. Three of the plans that emerged from retiling the 2002 plan had positive DVC scores, indicating that it was possible to construct plans with less variation in population density along with either little or no loss in average compactness.

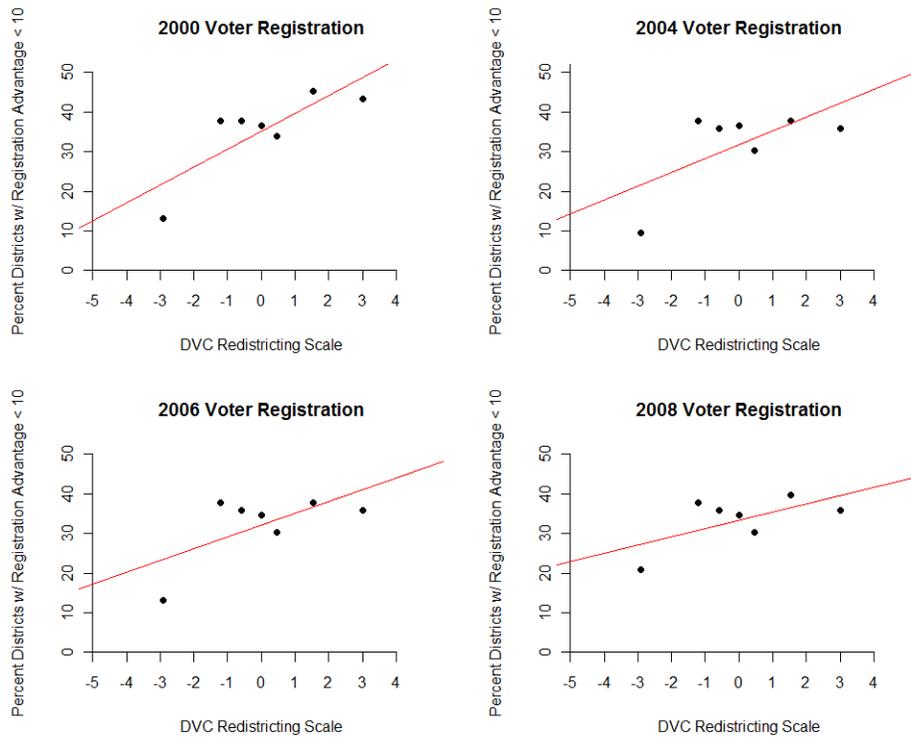
Table 1. DVC scale, DVC scale components, and percentage of districts with < 10% registration advantage: California voter registration data							
Plan	DVC scale and scale components			Percentage of districts with < 10% registration advantage			
	Population density: average absolute deviation	Compactness: Average Reock compactness	DVC score	2000 voter registration	2004 voter registration	2006 voter registration	2008 voter registration
2000 districts	3184	0.40	0.00	36.5%	36.5%	34.6%	34.6%
2002 districts	3617	0.31	-2.92	13.2%	9.4%	13.2%	20.8%
Retiling, northwest start	3382	0.37	-1.21	37.7%	37.7%	37.7%	37.7%
Retiling, southwest start	3114	0.32	-0.60	37.7%	35.8%	35.8%	35.8%
Retiling, LA horizontal start	2938	0.33	0.46	34.0%	30.2%	30.2%	30.2%
Retiling, LA "flower" start	2589	0.36	3.00	43.4%	35.8%	35.8%	35.8%
Retiling, LA start, compact	2896	0.40	1.55	45.3%	37.7%	37.7%	39.6%

The latter four columns of Table 1 report, for each of four years of voter registration data, the percentage of districts featuring registration advantages favoring one major party or the other by less than 10%. Figure 1 shows scatter plots with this percentage on the y-axis versus the DVC score on the x-axis. The correlations are 0.82, 0.65, 0.65, and 0.63 for registration data from 2000, 2004, 2006, and 2008, respectively, where a positive correlation suggests that higher values of the DVC scale are associated with larger proportions of districts with a registration advantage of less than 10%.

As noted by Cain, et al. (2006), people with common partisan preferences often cluster in the same areas, so a redistricting approach that attaches some weight to compactness can be expected to produce a certain number of safe seats for one party. Some commentaries (e.g., Council for Excellence in Government / Campaign Legal Center 2005) have voiced the possibility that a system could be too responsive, with minor shifts in partisan preference changing so many seats that the system would lack stability, but there seems to be little risk of such a concern in the present context, as fewer than half of all districts in the plans considered here have a registration advantage of less than 10%. Cain, et al. (2006) also pointed out that the 2002 redistricting in California had no

congressional districts within the range of voter-registration balance most likely to result in turnover in representation even though it would have been possible to construct plans with many seats in this range. The findings in Table 1 similarly suggest that the 2002 redistricting in California did not prioritize electoral responsiveness and that the alternate plans considered here, all of which had higher DVC scores than the 2002 plan, would have produced closer partisan balance in some districts.

Figure 1. California voter registration data: Percentage of districts with registration advantage < 10% versus DVC redistricting scale score



3.4 Descriptive findings from Texas election data

Texas was home to high-profile redistricting battles during the past decade, culminating in the Supreme Court ruling in *League of United Latin American Citizens v. Perry* (2006). Following the 2000 census, Democrats controlled the Texas State House of Representatives while Republicans had the tie-breaking vote in a split Texas State Senate; after they failed to agree on a plan, a panel of three federal judges produced an initial redistricting close to the previous plan based on the 1990 census, which had been overseen by a majority-Democratic state

legislature (SourceWatch 2010). In the 2002 elections, Democrats emerged with 17 congressional seats compared to 15 seats for Republicans, although Republicans took control of the state legislature. In a highly-publicized sequence of events, featuring an attempt by Democratic state legislators to deny Republicans a necessary parliamentary quorum by leaving the state for an extended period (Toobin 2006), the Republican majority was eventually able to pass an alternative plan that was used in the 2004 elections, yielding 21 seats for Republicans and 11 for Democrats. The Supreme Court did not judge the partisan elements of the 2004 redistricting to be in conflict with prevailing law but did regard districts in the western part of the state to be deficient with respect to provisions of the Voting Rights Act, which requires plans to take account of the racial/ethnic composition of the electorate. An updated redistricting plan in 2006 addressed the Voting Rights Act considerations but was similar to the 2004 plan for most of the state.

Table 2 reports values of the DVC redistricting scale and its component inputs for ten congressional-district plans, along with the percentage of districts in each plan featuring a margin of victory of less than 10% for each of four statewide elections (2004 Presidential, 2006 Senate, 2008 Senate, 2008 Presidential). The featured plans include the actual 2002 plan that was put forward by a panel of federal judges, the actual 2004 plan that emerged following the high-profile political drama, the actual 2006 plan that was developed to respond to the Supreme Court decision citing Voting Rights Act concerns, six candidate plans developed through retiling, and the actual year 2000 district plan, which was used as a reference plan.

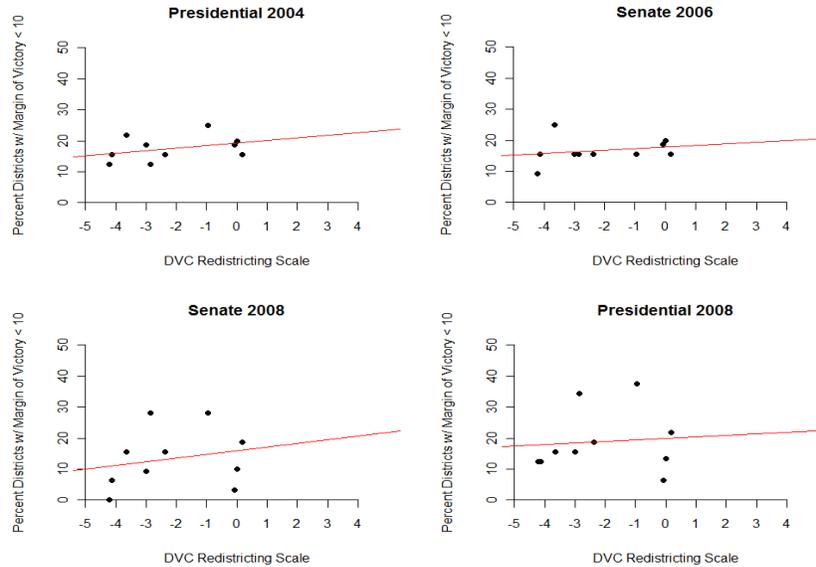
The 2002 districting had a DVC score of -0.08, with somewhat greater density variation but also somewhat greater average compactness than the 2000 plan. The 2004 redistricting gave rise to a DVC score of -4.22, driven by larger variation in population density across districts than the 2000 plan. Only one of the six retiled alternatives resulted in a positive DVC score, but this example illustrates that it was possible to have less variation in population density than the 2000 plan with little reduction in average compactness.

Table 2 also reports for each of four statewide elections the percentage of districts featuring margins of victory favoring one major party or the other of less than 10%. Across time, the percentage of seemingly safe districts under the 2004 plan was higher in three elections and lower in one election than for the 2002 plan. Figure 2 shows scatterplots of plans with the percentage of elections within a 10% margin of victory on the y-axis versus the DVC score on the x-axis; these data give rise to correlations of 0.36, 0.23, 0.22, and 0.09 for the 2004 Presidential election, the 2006 Senate election, the 2008 Senate election, and the 2008 Presidential election, respectively. As before, positive correlations imply that higher values of the DVC scale are associated with higher proportions of districts with a margin of victory of less than 10%.

Table 2. DVC scale, DVC scale components, and percentage of districts with < 10% margin of victory: Texas election data							
Plan	DVC scale and scale components			Percentage of districts with < 10% margin of victory			
	Population density: average absolute deviation	Compactness: Average Reock compactness	DVC score	2004 Presidential election data	2006 Senate election data	2008 Senate election data	2008 Presidential election data
2000 districts	838	0.33	0.00	20.0%	20.0%	10.0%	13.3%
2002 districts	898	0.39	-0.08	18.8%	18.8%	3.1%	6.3%
2004 districts	1141	0.32	-4.22	12.5%	9.4%	0.0%	12.5%
2006 districts	1141	0.32	-4.12	15.6%	15.6%	6.3%	12.5%
Retiling, west start	1114	0.34	-3.66	21.9%	25.0%	15.6%	15.6%
Retiling, south start	1050	0.34	-2.85	12.5%	15.6%	28.1%	34.4%
Retiling, Dallas start	812	0.31	0.19	15.6%	15.6%	18.8%	21.9%
Retiling, Dallas "flower" start	997	0.33	-2.38	15.6%	15.6%	15.6%	18.8%
Retiling, Houston start	874	0.31	-0.95	25.0%	15.6%	28.1%	37.5%
Retiling, compact	1185	0.42	-3.01	18.8%	15.6%	9.4%	15.6%

In each of our evaluations based on Texas election data, fewer than 40% of the districts had margins of victory of less than 10%. The plan that appeared to have the greatest number of close elections, namely the plan based on starting the retiling process in Houston, did not have the highest DVC score; more generally, there is an imperfect correlation between DVC score and the percentage of districts with close elections. But all six of the retiled plans dominated the 2004 plan in terms of having at least as large a proportion of districts with margin of victory less than 10% in all elections and a greater proportion in at least one election, and a similar pattern was seen in comparison with the 2006 plan, as five of the six retiled plans had a higher proportion of close results in all four elections and one plan had a higher proportion of close results in three of four elections. All of the retiled plans also had higher DVC scores than those for the 2004 and 2006 plans.

Figure 2. Texas election data: Percentage of districts with margin of victor < 10% versus DVC redistricting scale



3.5 Evaluation based on estimates of partisan bias and responsiveness

For each of the Texas redistricting plans we considered, we paired the DVC measure for the plan with JudgIt software estimates of partisan bias and electoral responsiveness. Because the 2006 redistricting plan involved limited modification of the 2004 plan, we consider separate analyses including each of these two plans in turn to avoid essentially doubling the weight given to the 2004 plan.

Figure 3 (on the next page) displays patterns of results for partisan bias for each of four statewide elections, and Figure 4 (on the following page) displays patterns for responsiveness. Both figures include the 2000, 2002, and 2004 plans along with six hypothetical plans (but not the 2006 plan, the pattern being similar when substituting the 2006 plan for the 2004 plan). The partisan-bias scale is defined with positive values referring to bias favoring Democrats and negative values referring to bias favoring Republicans. Given the observed ranges of the measures, plans producing less negative values on the DVC scale were associated with a smaller magnitude of partisan bias, while there was not a consistent pattern relating DVC scores to the direction of responsiveness estimates. Using the 2006 rather than the 2004 plan in the analysis, the correlations between DVC and partisan bias were 0.35, 0.33, 0.55, and 0.38 and the correlations between DVC and responsiveness were -0.27, -0.37, 0.25, and 0.06 for the 2004 Presidential, 2006 Senate, 2008 Senate, and 2008 Presidential elections, respectively.

Figure 3. Estimates of partisan bias versus DVC measure for Texas redistricting plans across four statewide elections

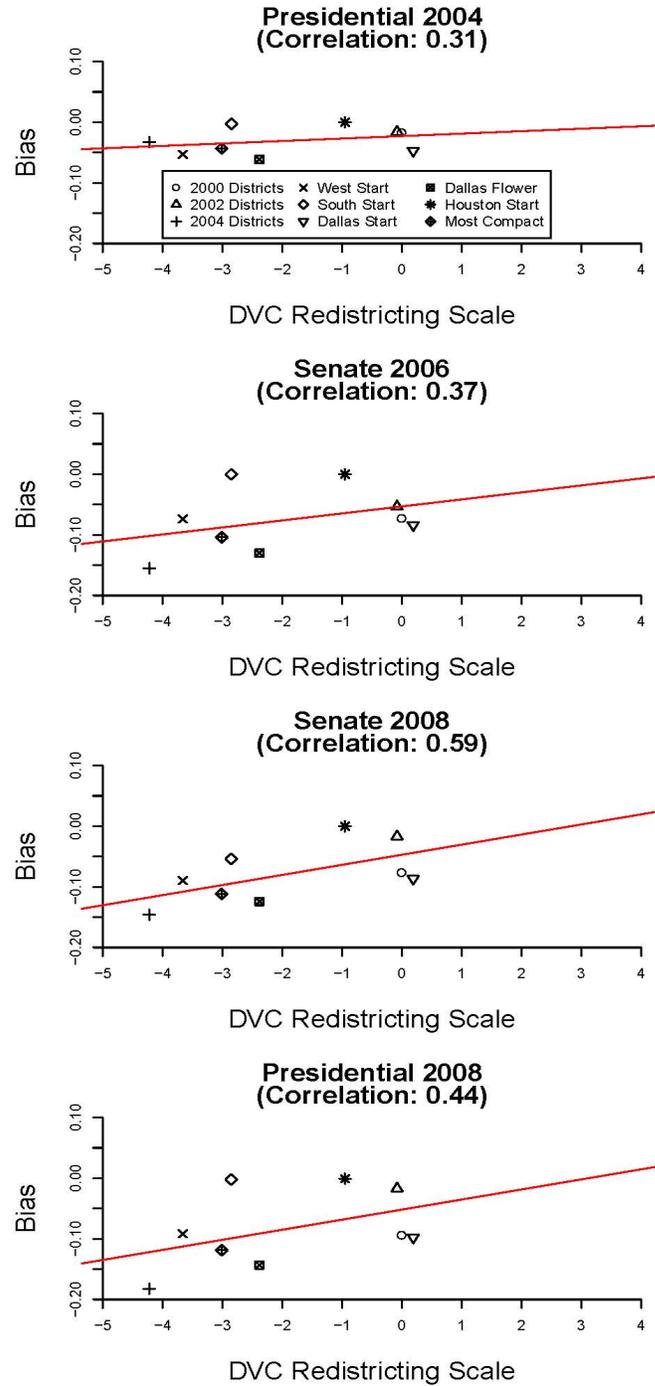


Figure 4. Estimates of responsiveness versus DVC measure for Texas redistricting plans across four statewide elections

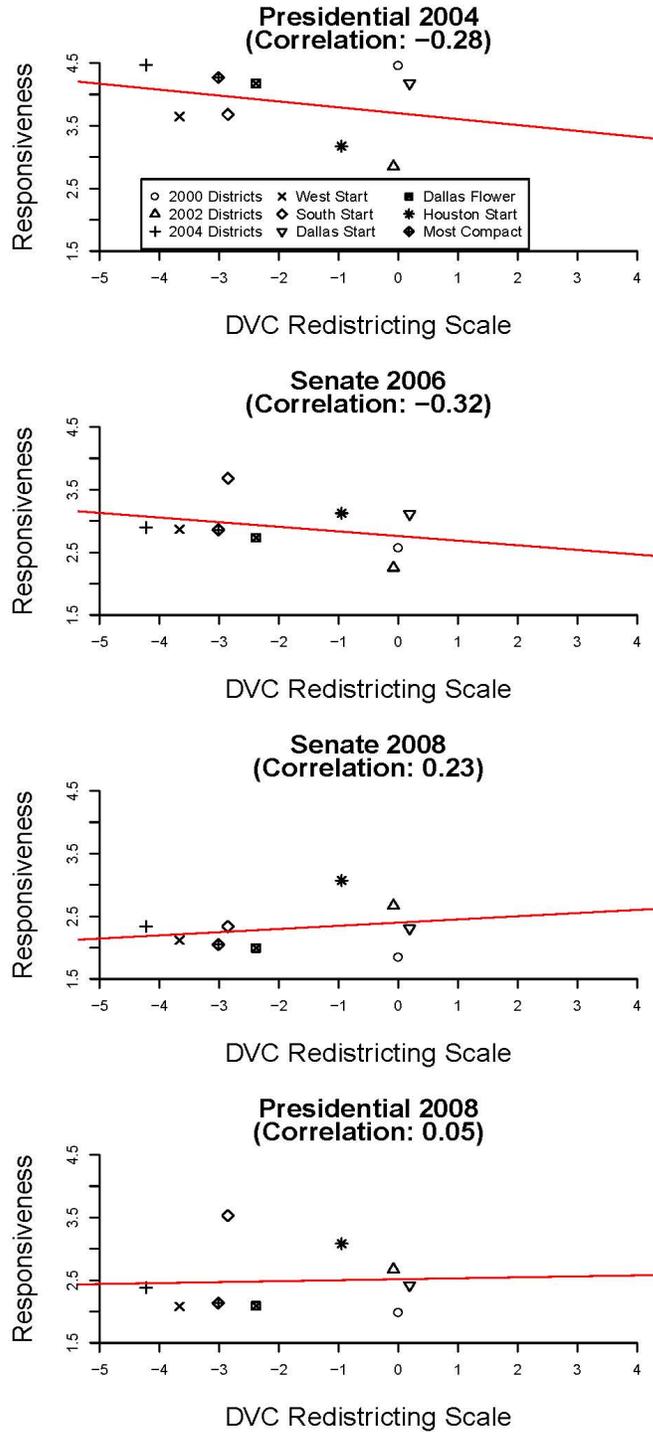


Table 3. Correlations among estimated partisan bias, estimated responsiveness, absolute average deviation among district-specific population densities, average compactness among district-specific population densities, and DVC score					
(a) Using 2000, 2002, 2004, and six hypothetical plans					
	Partisan bias	Responsiveness	Density variation	Average compactness	DVC score
Partisan bias	1	0.57	-0.38	-0.01	0.38
Responsiveness	0.57	1	0.00	-0.12	-0.05
Density variation	-0.38	0.00	1	0.44	-0.94
Average compactness	-0.01	-0.12	0.44	1	-0.11
DVC score	0.38	-0.05	-0.94	-0.11	1
(b) Using 2000, 2002, 2006, and six hypothetical plans					
	Partisan bias	Responsiveness	Density variation	Average compactness	DVC score
Partisan bias	1	0.55	-0.37	-0.03	0.37
Responsiveness	0.55	1	-0.02	-0.13	-0.06
Density variation	-0.37	0.02	1	0.44	-0.94
Average compactness	-0.03	-0.13	0.44	1	-0.12
DVC score	0.37	-0.06	-0.94	-0.12	1

Based on aggregating data across all four elections, Table 3 summarizes correlations among estimated partisan bias, estimated responsiveness, the DVC measure, and its components of density variation and average compactness. The correlations of partisan bias with density variation and DVC scores were between 0.3 and 0.4 in magnitude, with lower density variation and higher DVC scores associated with a smaller magnitude of partisan bias, while the correlation between partisan bias and compactness was less than 0.1 in magnitude. The correlations of responsiveness with density variation and DVC scores were less than 0.1 in magnitude, while the correlation between responsiveness and compactness was between 0.1 and 0.2 in magnitude, with higher average compactness associated with lower responsiveness.

4. Discussion

In a context where partisan advocates can be expected to apply modern technology to data on partisan preference to advance their interests, the use of a DVC measure can serve as check on attempts to introduce partisan bias into the redistricting process. Just as demography does not perfectly predict partisan preference, neither will a DVC measure be a perfect proxy for partisan bias or electoral responsiveness. But empirical evidence regarding the proposed DVC measure, while limited, points to a more favorable profile in terms of partisan bias and electoral responsiveness than the redistricting criterion of compactness has by itself.

The development of a specific DVC measure involved numerous choices. In the Appendix that follows, we elaborate on the motivation for various choices made in defining the proposed DVC measure.

Thoughtful observers have struggled to develop standards for redistricting that are fair, complete, and unambiguous, but it is a difficult task. Westmiller (2000) characterized four types of redistricting criteria: (1) geometric criteria, such as compactness of district shapes and contiguity of districts; (2) “poliocentric” criteria, such as limiting the number of political jurisdictions represented in a district; (3) “ethocentric” criteria, defined by shared interests (e.g., oriented along a major roadway that might induce shared economic interests among people who live near it); and (4) ethnocentric criteria, reflecting racial or ethnic composition of a district’s constituents. But criteria can be expected to conflict, and attaching importance to competing constraints can actually provide cover for individuals to pursue partisan goals while purportedly advancing the public interest (Cox 2004). In addition to making procedural recommendations, the report of a 2005 Redistricting Reform Conference suggested that the following redistricting standards be applied in rank order from most to least important: (1) adhere to all constitutional and Voting Rights Act requirements, (2) promote competitiveness and partisan fairness, (3) respect political subdivisions and communities of interest, (4) encourage geographical compactness and respect for natural geographic features and barriers (Council for Excellence in Government / Campaign Legal Center 2005). We envision the DVC scale being applied to candidate plans that satisfy legal requirements and do their best to reflect political subdivisions, communities of interest, and geographic features, offering a marker of the extent to which other criteria are met.

In a partisan-controlled redistricting process, it is possible to “pack” voters of the opposition party into a small number of districts while maintaining a partisan advantage in the other districts (e.g., Friedman and Holden 2008). For example, in a hypothetical state with 7 districts and an even partisan balance in voter registration, it might be possible to construct all 7 districts with close to 50-50 balance in voter registration, or to have the same number of safe seats for each party and an odd number of seats with close to 50-50 balance. But it would also be conceivable to have 5 equal-sized districts with a 60-40 registration advantage for the partisans in control, one district with a 70-30 registration edge for the opposition party, and one district with an 80-20 registration edge for the opposition party, thus resulting in the party in control routinely winning 5 of the 7 seats unless there was an extraordinary shift in public opinion.

By way of analogy, suppose the champion of the National Basketball Association, currently determined through a best-of-7-game series of 5-on-5 games between the winners of the league’s two conferences, were instead determined by a 7-game series subject only to the constraints that each game

would have 10 players and the average number of players across games would be 5 to a side, with the team representing the conference that won the annual 5-on-5 All-Star Game allowed to determine the number of players for each game of the championship series. The team dictating the rules could then call for five games to be played 6-on-4, one game to be played 3-on-7, and one game to be played 2-on-8, thus satisfying the constraints. One would not expect any of the individual games to be competitive, since any advantage in the number of professional-caliber basketball players would make a team a prohibitive favorite to win that game, and almost certainly, the team representing the conference that won the All-Star Game would win the championship series.

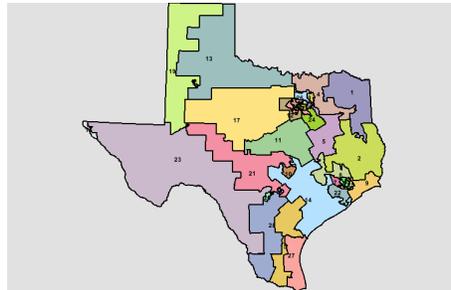
One might consider such a system to be “fair” in the sense that the two conference representatives would each have an equal chance of claiming the NBA championship based on their fellow conference players having had an equal chance of winning the NBA All-Star Game. But such a system would presumably be rejected by NBA fans as absurd due to its violation of the spirit of competition that has traditionally been valued in professional sport. In the redistricting context, it is not apt to be possible to make every electoral district as competitive as a 5-on-5 professional basketball game, but using a DVC measure to favor plans that intentionally introduce a degree of balance population density can be expected to avoid scenarios where there are no competitive districts.

In informal discussions, it has been suggested to us that fairness would be served by imposing compact shapes on areas without regard to the composition of the districts, but we remain convinced that information on the composition of districts, while subject to misuse, can also help advance desired goals. To use an experimental-design analogy, incorporating an observable factor known to be predictive of study outcomes as a blocking factor in an experiment can give rise to a more sensitive test of a treatment effect than a completely randomized design. In the redistricting context, where it is known that population density is predictive of partisan preference, it stands to reason that intentionally balancing population density across districts could be expected to do a better job of constraining partisan bias than ignoring information on district composition.

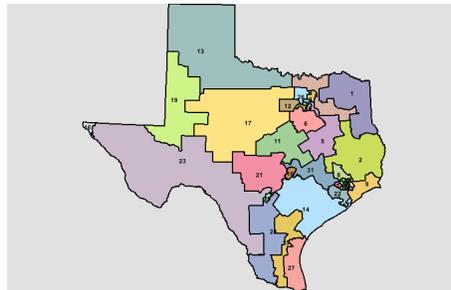
Meanwhile, we do not have confidence that partisanship in redistricting would be revealed solely through examination of the shapes of districts. Figure 5 (on the next page) shows the sequence of redistricting plans used for the 2000, 2002, and 2004 elections in Texas. All of the plans feature a mix of district shapes, with some fairly compact districts and some irregularly shaped districts, as well as a mix of district sizes, with some districts encompassing small, densely populated geographic areas and other districts covering large, sparsely populated geographic areas. Without more knowledge, it is (at least arguably) not obvious as a matter of face validity that one plan would be more desirable than another in terms of partisan bias or electoral responsiveness, yet there are clearly meaningful

differences at stake based on the observed turnover in political representation across the elections based on these plans.

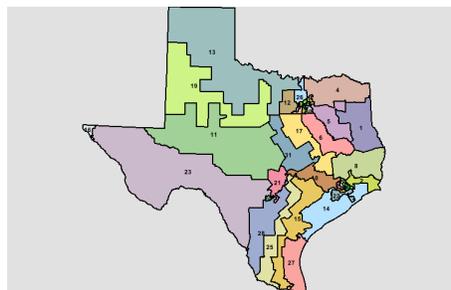
Figure 5. Texas redistricting plans:
(a) Districts used in 2000 election of 107th Congress
(b) Districts used in 2002 election of 108th Congress
(c) Districts used in 2004 election of 109th Congress



(a)



(b)



(c)

Source: SourceWatch (2010).

Gelman and King (1994), in a point echoed by Cox (2004), note that partisan bias and electoral responsiveness are apt to be correlated in a system where seats are awarded within single-member districts based on a plurality of voters. The reasoning is that to benefit from partisan bias, a party would have to

accept less overwhelming advantages (e.g., 55-45 or 60-40) in districts where it is favored than the advantages held by the opposition (e.g., 70-30 or 80-20) in the districts where the opposition is favored. In our evaluation of alternative plans for Texas, we found that higher DVC scores were associated with a lower magnitude of partisan bias, but we did not see a correlation between DVC scores and electoral responsiveness. This pattern deserves to be evaluated further across a broader set of scenarios, but if it holds up, it would be a desirable feature of the DVC approach.

The observed correlations between DVC scores and outcome measures were not as high with the Texas data as were seen with California data. It is typical for goodness-of-fit summaries to look better in the data set used to develop a measure than in a new data set; this finding might also relate to differences that can be expected between registration data, which were available for California, and election results, which were available for Texas. Also, limiting attention to plans formed by retiling “quarter-districts” that were subsets of the most recent congressional districts avoided time-intensive efforts to satisfy equal-population constraints that have been strictly enforced by U.S. courts, but the retiling approach also restricted the set of redistricting plans under consideration. We expect that additional investigation not bound by constraints associated with previous plans would give rise to a wider range of DVC scores and presumably a wider range of partisan bias and responsiveness estimates as well. It would be relevant to investigate a broader set of states, redistricting plans, and data sources to better understand the statistical properties of DVC measures.

Although redistricting is constrained by constitutional requirements, the federal Voting Rights Act, and applicable state laws (Council for Excellence in Government / Campaign Legal Center 2005), we do not see any inherent legal conflict with the idea of using a DVC measure to help guide the choice of a redistricting plan. A DVC measure should not be viewed as replacing more direct evaluation of “partisan symmetry” drawing on assessments of seats-votes relationships (King, Grofman, Gelman, Katz 2005; Grofman and King 2007) but rather is an accessible summary that can be viewed as a marker for partisan fairness while addressing the information asymmetry described in the introduction to this article. Considering that we do not propose using a DVC measure as a strict constraint on the selection of a redistricting plan, it is hard to imagine how the use of census and geographic summaries to inform the choice of a plan could be viewed as illegal.

Regarding the mid-decade redistricting controversy in Texas, while some might be tempted to place substantial weight on the DVC scores of -0.08, -4.22, and -4.12 associated with the 2002, 2004, and 2006 Texas district plans, respectively, our view is more circumspect. First, as noted earlier, the 2004 and 2006 Texas plans were very similar and should not be regarded as entirely distinct

observations. Although the proportion of close contests was higher for the 2002 plan than for the 2004 or 2006 plans in three of the elections considered here, one election featured a smaller proportion of close contests for the 2002 plan than for the 2004 and 2006 plans. One of the retiled plans we explored (West start) had a higher proportion of close elections than all of the 2002, 2004, and 2006 plans but had a lower DVC score than the 2002 plan. We would not be surprised if further investigation were to give rise to a new plan with both a higher DVC score and greater proportion of districts with close elections than the 2002, 2004, and 2006 plans, but the DVC score must be understood as a marker and not as a perfect reflection of partisan fairness.

We are optimistic that the logic behind the DVC measure would be broadly accessible to the public as a framework for encouraging competition and fair play in elections. An analogy might be drawn to readily-accepted salary caps in sports, where the introduction of constraints on the development of team rosters builds on a principled desire to balance the distribution of talent across teams.

We are also optimistic that the kind of one-number summary proposed here will facilitate public discussions of redistricting without requiring an explanation of abstractions in every retelling. An analogy here might be drawn to ratings of energy efficiency for household appliances, which have underlying meaning in terms of British thermal units of cooling output per watt-hour of energy input but which might be used in practice simply as ordinal measures, with consumers expressing preferences for appliances with higher ratings.

Finally, we believe that introducing a seemingly modest piece of information into public discussions of redistricting could have a meaningful and positive impact on the redistricting process. We see an analogy between dissemination of DVC scores and dissemination of statistics summarizing airline on-time arrivals, which sought to limit the practice of airlines claiming unrealistic arrival times in order to gain an advantage in computerized travel-reservation systems (GAO 1990), as within a short time of the publication of on-time arrival statistics, airlines modified their schedules to make the arrival times more accurate.

We believe that the development of a statistical summary of density variation and compactness has great potential to elevate and transform public discussions of the redistricting process. The required inputs (namely population counts from the census, geographic area of the district, and compactness of district geography) are readily accessible and straightforward to extract from available redistricting software, and the required calculations can be performed in a spreadsheet or even by hand. We believe it would be reasonable for public officials to include DVC scores among the multiple factors they consider in deciding on a redistricting plan, and we would strongly encourage the routine reporting of DVC scores with candidate redistricting plans.

Appendix: Motivation for the proposed DVC measure

The development of the proposed DVC measure was influenced by a number of considerations, summarized here through answers to several questions:

Why consider population density in legislative redistricting?

Recent patterns of voting in U.S. presidential elections (e.g., Gastner, Shalizi, and Newman 2004) and the corresponding portrayal of election results by news organizations on national maps have given rise to familiar characterizations of states as either “red states” that lean toward Republican candidates or “blue states” that lean toward Democratic candidates (e.g., Gelman 2008). Although various explanations for the observed patterns have been proposed (e.g. Frank 2004), the idea for this work was triggered by an observation made by David Brooks of the *New York Times* as part of a public-television panel commenting on the election returns from the 2004 presidential election: when asked why the election map looked the way it did, with coastal and northern industrial states colored blue and central, southern, and plains states colored red, Brooks suggested “housing density” as a single quantity that explained the pattern.

As a predictor of election results, housing density not only explains variation between states, with disproportionately urban states more likely to be blue and disproportionately rural states more likely to be red, but also explains variation within states (see, e.g., “Election results by county” in Gastner, Shalizi, and Newman 2004, where urban areas tend to be blue and rural areas tend to be red). Although the DVC idea could conceivably be implemented using housing density, doing so would require additional information in the form of census housing counts to be delivered to states for redistricting purposes. A simpler strategy is to make use of population density, which similarly explains variation in election results but does not require access to any additional census information beyond currently available population counts.

Although population density has been relevant to electoral politics across many decades, the connections between population density and partisan preference have not been static over time. In particular, the results of elections from the late 19th and early 20th centuries featured Republican advantages in the higher-density states and Democratic advantages in the lower-density states (see, e.g., the 1896 election map from PresidentElect.org). Thus, the use of population density in redistricting is apt to be politically palatable not only because it can be derived solely from census counts and district geography but also because it has not had a static historical relationship with political party preference.

Why combine a summary of district population densities with a summary of the geometric compactness of districts?

The concern associated with enforcing balance in population density to the exclusion of other criteria can be understood through an example. Consider the following hypothetical strategy for balancing population density across a set of districts in New York state. One district could start on lower Manhattan, follow 11th and 12th Avenues through the city, continue through Westchester, then make a sharp left and continue with a narrow width all the way to Lake Erie. Additional districts could similarly go up other major avenues in Manhattan and continue to the Great Lakes, forming a series of “spaghetti” shaped districts. By including a mix of high-density areas in Manhattan and low-density areas of upstate New York, such a plan could be expected to do a better job of achieving balance across districts in housing density than a redistricting plan where certain districts are entirely comprised of areas in New York City and other districts are entirely comprised of areas in upstate New York.

In our view, the flaw with the hypothetical redistricting plan with narrow spaghetti-shaped districts would not be its low level of variation in population density but rather its lack of attention to communities of interest (e.g., Council for Excellence in Government/Campaign Legal Center 2005; Levitt 2010). Communities of interest could include political jurisdictions with corresponding interests, groups of areas with shared economic interests, or other groupings of areas with common interests such as those encompassed by the Voting Rights Act. (An anonymous referee noted that a number of states have laws that enshrine certain communities of interest; for example, Iowa law dictates that congressional district lines shall not divide counties, of which there are 99 in the state.) Although communities of interest do not necessarily arise in regular geometric patterns, the notion of local representation does carry an implication that people within a district have some form of common geography. The use of geometric compactness as a constraint, which avoids having district shapes that are very irregular as in the hypothetical scenario of spaghetti-string districts, can be expected to guard against extreme violations of the notion of local representation.

Why use average absolute deviation as a measure of density variation?

Accepting the general idea of focusing on density variation in a DVC measure, our intuition is that alternative measures of density variation, such as average absolute deviation or the standard deviation among district-specific population densities, would yield similar results. Ultimately, we chose to use the average absolute deviation in part because we thought it would be understood by a broader

segment of the public, and perhaps that a broader segment of the public would be able to implement the idea in spreadsheets of their own. While it is arguably not essential that members of the public understand the calculation of a statistic being proposed as an indicator in the highly complex context of selecting a districting plan for use in numerous elections, we did not anticipate any harm from using average absolute deviation in terms of the statistical properties of the DVC measure, and we thought it could not hurt if a broader segment of the public understood or was capable of implementing the relevant calculations.

Why use the Reock measure of compactness?

Compactness of legislative districts can be summarized in several possible ways (Young 1988; Avencia 2009; Fryer, Jr. and Holden 2011). Because a circle is mathematically the most compact shape encompassing a given area, multiple approaches have been proposed relate the shape of a legislative district to a circle. Other measures focus on summaries of district perimeters, and there are hybrid approaches that use district-perimeter calculations and relate them to the area of a relevant circle. Summaries available in Maptitude 5.0 software include the Reock measure (Reock 1961), which computes the ratio of the area of the district to the area of the minimum enclosing circle for the district; the Perimeter Test, which computes the sum of all perimeters in a districting plan and has been advocated by some authors (Dixon 1968; Adams 1977); the Schwartzberg criterion (Schwartzberg 1966), which compares the perimeter of a district to the perimeter of a circle encompassing the district; and the Polsby-Popper measure (Polsby and Popper 1991), which computes the ratio of the district area to the area of a circle with the same perimeter. Recent work by Fryer, Jr. and Holden (2011) developed a “relative proximity index” as a compactness measure that considers distances between voters in a district relative to the minimum achievable sum of such distances, thus avoiding an implicit assumption that people are uniformly distributed within districts.

In our DVC calculations, we incorporated the Reock measure of compactness, which is always between 0 and 1, with 1 being the most compact. Our choice was partly based on the prevalent use of the Reock measure in redistricting settings and partly on the accessibility of the measure in Maptitude software. While we expect that a DVC measure would perform similarly if another compactness measure were used, this should be regarded as an open research topic.

Why use values of density variation and compactness from a reference plan?

Given variation in population density, with the previously noted range from 1.1 persons per square mile in Alaska to 1,134.4 persons per square mile in New Jersey (Census Bureau, 2001), it is not realistic to view absolute measures of population density as exchangeable across states. We faced this issue early in our research as we considered how to develop a measure using data from California that we could apply without any modification or adaptation to data from Texas.

Because population density within states does not change too rapidly over time, we reasoned that a relative measure would more plausibly have a stable relationship across states than an absolute measure of variation in population density. The idea is that a reference plan could provide a benchmark both for variation between districts in population density and for average compactness. The year 2000 was a convenient choice as a benchmark year.

What is the motivation for subtracting 1 from the ratios in the DVC formula?

We judged that it would be desirable for a DVC scale to have a meaningful zero value, which could correspond to a candidate redistricting plan having aggregate properties deemed equivalent to the reference plan. Because the ratio $\frac{V_{ref}}{V_p}$ takes on a value of 1 if the candidate plan has equivalent density variation as the reference plan, the subtraction of 1 within the left-hand bracketed expression implies that contributions to the overall score will be less than 0, equal to 0, or greater than 0 depending on whether the candidate plan has greater, the same, or less density variation than the reference plan, respectively. A similar interpretation applies to the subtraction of 1 from the ratio $\frac{\bar{c}_p}{\bar{c}_{ref}}$, except that contributions to the overall score will be less than 0, equal to 0, or greater than 0 depending on whether the candidate plan has lower, the same, or greater average compactness than the reference plan, respectively.

What is the motivation for scaling factors in the DVC formula?

A first consideration in scaling terms in the DVC formula was the relative weight to attach to density variation versus average compactness. One possibility would have been to attach equal weight to density variation and compactness. But given that density is being viewed as a proxy for the partisan political interests that drive public debate and present the public with choices in elections, while compactness is being viewed as a tuning factor to avoid extreme irregularity in district shape to

help preserve communities of interest, a subjective decision was made to assign three times as much weight to density variation as to average compactness. Exploration of different weighting choices in DVC measures remains a researchable topic.

Similarly, the determination of a scale for DVC measures required investigator judgment. The choice of the factors 15 and 5 grew out of considering numerical values that would make sense to associate with a plan that is hard to improve upon. There is not a gold standard of perfection that would suggest a highest possible score in this context, but we judged that it would be desirable to have a frame of reference for interpreting DVC scores that would be familiar to the voting population. Given widespread familiarity with 4-point grade-point-average scales, we thought that understanding of DVC scores might be enhanced if a score of 4.0 would be regarded as a very high score (although unlike grade-point-average scales, DVC scores would be allowed to go below 0). In our experience so far, 3.00 is the largest DVC score we have seen using the factors 15 and 5. But the set of retiled plans we explored is limited, and we would not be too surprised if DVC scores above 4.0 were to emerge in future explorations using 15 and 5 as factors in the DVC formula. Again, investigation of scaling factors could be the subject of future research, perhaps based on the extent to which public understanding is facilitated by certain choices of DVC scaling factors.

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Dear Commissioners,

Following up on my presentation as Speaker 83 at the Los Angeles public input hearing on April 28, I wanted to write in support of having you publish density-variation/compactness (DVC) scores alongside each redistricting plan you put forward for public consideration. The just-published article

Belin, Thomas R., Fischer, Heidi J., and Zigler, Corwin M. (2011)
"Using a Density-Variation/Compactness Measure to Evaluate Redistricting Plans for Partisan Bias and Electoral Responsiveness,"
Statistics, Politics, and Policy, Vol. 2, Issue 1, Article 3
Available at: <http://www.bepress.com/spp/vol2/iss1/3>

offers relevant information and support for this idea. I would ask that the entire article be included in the public record.

To summarize the calculation of DVC scores for the record, consider a given plan with D districts, where D = 53 for Congressional districts, 80 for State Legislative districts, 40 for State Senate districts, and 4 for Board of Equalization districts. Let the population density (i.e., population divided by geographic area) of the districts be denoted by w_1, w_2, \dots, w_D , and let measures of the compactness of each district be denoted by c_1, c_2, \dots, c_D . (Different measures of compactness have been proposed; among the most widely used is known as the Reock measure of compactness, which is a number between 0 and 1 that is routinely available from redistricting software.) To obtain a DVC score, one can start by calculating the average density

$$w_{ave} = (1/D) \times (w_1 + w_2 + \dots + w_D)$$

and the average compactness

$$c_{ave} = (1/D) \times (c_1 + c_2 + \dots + c_D)$$

The calculation also involves the average absolute deviation among the density measures, which can be denoted by V and written as

$$V = (1/D) \times (|w_1 - w_{ave}| + |w_2 - w_{ave}| + \dots + |w_D - w_{ave}|)$$

where the vertical-bar notation refers to absolute value. The final ingredients in the DVC formula are the average absolute deviation (V_{ref}) and average compactness (c_{ref}) from a reference year. If, as in the article, the reference year is taken to be year 2000, the following reference values are implied for California districts:

Congressional districts:	$V_{ref} = 3184$	$c_{ref} = 0.40$
State Legislative districts:	$V_{ref} = 3716$	$c_{ref} = 0.34$
State Senate districts:	$V_{ref} = 2784$	$c_{ref} = 0.32$
Board of Equalization districts:	$V_{ref} = 1530$	$c_{ref} = 0.31$

The DVC formula is then given by

$$DVC = 15 \times [(V_{ref} / V) - 1] + 5 \times [(c_{ave} / c_{ref}) - 1]$$

The article provides motivation for the formula; in short, the DVC formula tends to favor balance in population density without sacrificing too much compactness. All of the calculations can be carried out by hand or by using a spreadsheet.

Given that the population density and compactness of districts are implied by district boundaries, DVC information will eventually come out; the only question is how timely and accessible the information will be. It would be consistent with the Commission's broader approach to transparency to provide DVC information right away, alongside each redistricting plan put forward by the Commission.

Finally, I wanted to try to bridge my suggestion at the April 28 hearing that the Commission could make use of DVC information if it so desired and the suggestion that came up during the question-and-answer period that the Commission is not allowed to consider competitiveness of legislative districts. In my comments, I alluded to the following language from the Frequently Asked Question section on the Commission's web site:

Q. Does the Act require that districts be more competitive, rather than dominated by one political party?

A: No. Historically, districts were drawn to favor incumbents and this naturally led to dominance by one political party. Under the Act, districts must be drawn to maximize voters' opportunity to elect representatives of their own choosing, and this may lead to more competitive races.

This perspective on maximizing voters' opportunity to elect representatives of their choosing is consistent with the view we expressed in our article that it would be reasonable for public officials to include DVC scores among the multiple factors they consider in deciding on a redistricting plan.

Whether you view DVC scores as useful information for fulfilling your role as Commissioners or simply as an easily satisfied public information request, I hope you will agree with me that it is important for the Commission to publish information on DVC scores. In disseminating the information, it would be possible to use neutral descriptive language such as, "The Commission received requests to publish information on density-variation/compactness (DVC) scores as outlined in a recent article in an academic journal [reference]. The DVC scores associated with the plans put forward here are [#] for Congressional districts, [#] for State Legislative districts, [#] for State Senate districts, and [#] for Board of Equalization districts." Thank you for your consideration.

Sincerely,

Thomas R. Belin, Ph.D.

Subject: Request for publication of DVC scores--further detail

From: "Belin, Thomas" <[REDACTED]>

Date: Tue, 24 May 2011 00:15:43 -0700

To: "[REDACTED]" <[REDACTED]>

Name: Thomas R. Belin

Email: [REDACTED]

General comment

Please see attached file in PDF format containing a public comment requesting that the Commission publish density-variation/compactness (DVC) scores alongside each redistricting plan submitted for public consideration. I am also attaching a PDF version of the article referenced in the comment. Thank you for your consideration.

Sincerely,
Thomas R. Belin, Ph.D.

IMPORTANT WARNING: This email (and any attachments) is only intended for the use of the person or entity to which it is addressed, and may contain information that is privileged and confidential. You, the recipient, are obligated to maintain it in a safe, secure and confidential manner. Unauthorized redisclosure or failure to maintain confidentiality may subject you to federal and state penalties. If you are not the intended recipient, please immediately notify us by return email, and delete this message from your computer.

t_belin_DVC_public_comment_052311.pdf

— dvc_article_spp_2011.pdf —

dvc_article_spp_2011.pdf

Subject: Redistricting Commission

From: "Mela DeLucas" <[REDACTED]>

Date: Tue, 24 May 2011 07:35:05 -0700

To: <[REDACTED]>

CC: <[REDACTED]>

To Whom It May Concern,

Redistricting is not an act of inequality and injustice, meaning we do not want to separate ourselves so that our districts become the minority voice combined with communities that really don't have a shared interest in creating an equal and improved environment for our families struggling today. This includes our schools, parks & recreations, senior services, youth services, homes and community betterment. When it comes to voting and elected officials we have to make sure we have representatives that care about the same interests as our own.

Thank you for all you do!

Mela Del Sol Pettis DeLucas
[REDACTED] Lemon Grove, CA 91945

Subject: quadruple checking procedures

From: "Robert J. Apodaca" <[REDACTED]>

Date: Tue, 24 May 2011 20:51:45 -0700

To: [REDACTED]

I (on behalf of United Latinos Vote and other supporters) submitted digital proposed redistricting maps yesterday before your deadline. Additional supporting documentation (digital files and paper documents) were hand delivered to your office in Sacramento on May 24, 2011. We were told that the documents had to be delivered to your meeting in Northridge on May 26th. Is this really required? Please advise ASAP because I'm in Oakland. Thanks.

--

Robert J. Apodaca

T [REDACTED] | F [REDACTED]

Subject: Citizen comments for Redistricting Commission

From: John Uebersax <[REDACTED]>

Date: Tue, 24 May 2011 14:38:14 -0700

To: [REDACTED]

Dear Redistricting Commission,

It would appear that I am emailing these comments one day after the official deadline for the current round of citizen comments. I request that you will please exercise the flexibility to accept them nonetheless.

One reason for the tardiness is the excessive time I have had to devote in recent days to monitoring and responding to, in accord with my civic duty, the recent escalation of US military involvement in the Libyan Civil War.

Comments are supplied in duplicate: that is, as both a pdf and doc file.

Thank you very much for your understanding and assistance.

With best regards,

John Uebersax

--

John Uebersax PhD

[REDACTED]

Uebersax - Citizen comments.pdf

~~Uebersax - Citizen comments.doc~~

Uebersax - Citizen comments.doc

John S. Uebersax PhD

[REDACTED]
Paso Robles, California 93446
United States

[REDACTED]
[REDACTED]
[REDACTED]

Monday, 23 May 2011

California Citizens Redistricting Commission
Sacramento, California (by email)

Dear California Redistricting Commission:

Subject: Citizen comments on US Congress Redistricting

(I could not readily discern from the text of the current Request for Comments, whether it solicits input for State or for Federal legislature redistricting. My comments suppose the latter, and are only directed to the drawing of US Congressional districts.)

We are, at this time, in the midst of a grave national crisis. While this is not something we tend to emphasize publicly – pessimism runs counter to the American spirit – each Commission member may privately reflect on this and come to his or her own conclusions.

Our domestic and foreign policies as a country are, in a word, disastrous. The main reason for this state of affairs, in my opinion and that of many others, is the negligence and compromised status of the United States Congress, including the House of Representatives.

Instrumental, if not wholly responsible, for this situation is the spirit of rancor and divisiveness which characterizes the Republican and Democratic parties, and the monopoly which these two parties, together, hold on national politics.

Even more fundamentally, it is evident, to anyone who chooses to investigate the matter objectively, that the policies of both parties are ultimately driven, not by the needs and interests of citizens, but by special interests – mainly, corporations, financial institutions, and, to a lesser extent, labor unions.

The ability of citizens to assert themselves and to produce stable, effective government is eliminated by a 'divide and conquer' strategy, promoted by these special interests, that permeates our government, media and culture.

Now concerning redistricting, there is one school thought – very prevalent, if not dominant today – that suggests that district boundaries should be based mainly on issues of local community homogeneity and heterogeneity, on the rationale that this will, somehow, produce more equitable representation in Congress, and a more just society with regards to diverse ethnic and cultural groups. I suggest, however, and emphatically so, that this view is fundamentally erroneous and misguided.

Far beyond ethnic and cultural differences, we are all Californians. Indeed, I am of the opinion that race, for example, is itself an unscientific and meaningless construct. As a statistician who has had occasion to study the matter formally, I can assert, beyond all

equivocation and doubt, that the variation within ethnic and community groups is so great that it vastly exceeds the average differences between groups. Two African-Americans, say, or two Hispanics, chosen at random are, basically, as likely to differ from each other, on any relevant index of comparison, as two randomly selected members of different ethnicities. The same can be said with respect to religion, education, or income.

We are not Black, Brown, Yellow, White and Red people. We are people. One people – all Californians – with precisely the same interest, which is the welfare of the whole. Ethnic divisions and rivalries have, ultimately, no basis in science or culture. Rather, divisions have been exaggerated and exacerbated by political demagogues and special interests with the specific aim of keeping us all incapacitated from effecting any real change in government. In the name of serving 'each', the 'all' suffer.

As should be completely obvious, California Congressional districts have, in the past, functioned to serve the joint interests of the Republican and Democratic parties, and the special interests who control them. The examples of this are too numerous to list here. In my opinion – as a social scientist, a statistician, and most importantly, as a citizen of California – this problem will persist until such time as a more objective and politically neutral criterion is used to draw Congressional boundaries.

I believe that the conventional theories of districting based on 'equitable ethnic and cultural representation' should be placed in the garbage bin. The so-called science of redistricting has been heavily contaminated with false opinion, self-interest, and the well-known academic depreciation of common sense. Indeed, modern theories of redistricting, based, as they are, on the culture of 'elitist' academic institutions, are heavily contaminated with the divisive spirit promoted by special interests, media, and party.

Moreover, any notion that this approach can be made more plausible or effective by use of multivariate statistical models is so far beyond being merely remote that it might be properly called absurd. Rather, every new variable introduced adds to the extended assumptions, and lessens the robustness and overall plausibility of any such approach.

What would be far better, in my opinion, would be, for example, to divide California into simple and consistent geometric areas – e.g., with horizontal or vertical lines – and to adjust them by algorithm or trial and error to produce the requisite Congressional districts.

Were it not the case that an inordinate amount of my professional and personal time must be spent dealing with the consequences of our dysfunctional Federal government, I believe I could make a solid and persuasive scientific case in defense of this view, based on research and sound theory.

Having supplied this perspective for your consideration, let me add the earnest wish that you will give it serious and unprejudiced thought, allowing yourselves the opportunity to reflect and consider it, detached from habitual modes of viewing the problem, and granting yourselves the luxury of entertaining what might at first seem too radical or unconventional a suggestion, but which is ultimately grounded in basic common sense.

The eyes of the state are on you, and – as California is arguably the most progressive state – those of the nation, and the world are as well. Perhaps, as Alexander Hamilton wrote in

the prefacing remarks to the Federalist Papers, "This idea will add the inducements of philanthropy to those of patriotism." In any case, your hard work and dedication to the people of California is most appreciated.

Sincerely yours,

John S. Uebersax



LEAGUE OF WOMEN VOTERS® OF CALIFORNIA

May 24, 2011

Via Electronic Mail
Citizens Redistricting Commission
1130 K Street, Suite 101
Sacramento, CA 95814

Re: Mapping Criteria in the Voters FIRST Act

Dear Members of the Citizens Redistricting Commission:

As you begin to draw the first draft maps, the League of Women Voters of California would like to offer some important considerations about the mapping criteria in the Voters FIRST Act. As you know, the criteria for drawing the maps are listed in a specific order, and you are directed by the Act to follow them in that order of priority. This is because in the complex task of drawing district lines, following one criterion may make it more difficult to fully adhere to another, lower one.

In particular, we would like to comment on the weight given to respect for the integrity of communities of interest as equal to the weight given to respect for cities, counties, cities and counties, and local neighborhoods.

The League played an integral role in the drafting of Proposition 11, the Voters FIRST Act, after working for several years on the wording of unsuccessful legislative proposals for reform. We had supported legislative bills that gave priority to communities of interest immediately after the criteria of equal population, adherence to the Voting Rights Act, and contiguity. Thus, as the discussions concerning the initiative proceeded, our position on communities of interest was clear from the beginning. Because the political and demographic geography of California is so diverse, communities of interest will often represent the real “local neighborhoods” of an area or region. Political boundaries are often arbitrary and may have been drawn long ago. While useful in mapping some areas, in many other cases they no longer reflect the actual demographic profile of an area or region.

We firmly supported having respect for the integrity of communities of interest at least in the same clause and given equal weight as respect for city and county boundaries. We signed on to the initiative measure only because respect for communities of interest was ranked just after compliance with the Voting Rights Act and geographic contiguity and equal in importance to keeping cities, counties, and neighborhoods whole.

[REDACTED]
[REDACTED]
Sacramento, CA
95814-3608

[REDACTED]
[REDACTED] fax
[REDACTED]

Drawing maps that truly empower voters throughout the state will, in certain areas, require keeping communities of interest whole, rather than maintaining artificial political boundaries which may not accurately reflect the population. We rely on your judgment to choose which approach is most appropriate for each region. **We caution against any mindset that would in all cases approach map drawing by first considering city and county boundaries and only secondarily bringing communities of interest into consideration.**

We have also observed that some members of the public encourage you to give greater weight to criteria that are low in the priority ranking, such as compactness or nesting, than to other, higher priority criteria. The Voters FIRST Act was carefully crafted with directions both as to the overall priority order and as to following such criteria “to the extent practicable, and where this does not conflict with the criteria [listed] above.” We are confident that you will follow those directions and trust that the public will be made aware of the process you have, of necessity, followed.

We thank you for your consideration of these comments and wish you well as you continue with your groundbreaking duties.

Sincerely,



Janis R. Hirohama
President