STATE OF NEW MEXICO
COUNTY OF LEA
FIFTH JUDICIAL DISTRICT

REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBBY AND DEE ANN KIMBRO, and PEARL GARCIA,

Plaintiffs,

v.

Cause No. D-506-CV-2022-00041

MAGGIE TOLOUSE OLIVER, in her official capacity as New Mexico Secretary of State, MICHELLE LUJAN GRISHAM, in her official capacity as Governor of New Mexico, HOWIE MORALES, in his official capacity as New Mexico Lieutenant Governor and President of the New Mexico Senate, MIMI STEWART, in her official capacity as President Pro Tempore of the New Mexico Senate, and JAVIER MARTINEZ, in his official capacity as Speaker of the New Mexico House of Representatives,

Defendants.

EXPERT REPORT OF SEAN P. TRENDE

Expert Report of Sean P. Trende

in *Republican Party of New Mexico et al., v. Oliver, et al.*

August 11, 2023

Table of Contents

1 Expert Qualifications

1.1 Career

I serve as Senior Elections Analyst for Real Clear Politics. I joined Real Clear Politics in January of 2009 after practicing law for eight years. I assumed a full-time position with Real Clear Politics in March of 2010. Real Clear Politics is a company of approximately 50 employees, with its main offices in Washington D.C. It produces one of the most heavily trafficked political websites in the world, which serves as a one-stop shop for political analysis from all sides of the political spectrum and is recognized as a pioneer in the field of poll aggregation. Real Clear Politics produces original content, including both data analysis and traditional reporting. It is routinely cited by the most influential voices in politics, including David Brooks of *The New York Times*, Brit Hume of Fox News, Michael Barone of *The Almanac of American Politics*, Paul Gigot of *The Wall Street Journal*, and Peter Beinart of *The Atlantic*.

My main responsibilities with Real Clear Politics consist of tracking, analyzing, and writing about elections. I collaborate in rating the competitiveness of Presidential, Senate, House, and gubernatorial races. As a part of carrying out these responsibilities, I have studied and written extensively about demographic trends in the country, exit poll data at the state and federal level, public opinion polling, and voter turnout and voting behavior. In particular, understanding the way that districts are drawn and how geography and demographics interact is crucial to predicting United States House of Representatives races, so much of my time is dedicated to that task.

I am currently a Visiting Scholar at the American Enterprise Institute, where my publications focus on the demographic and coalitional aspects of American Politics.

1.2 Publications and Speaking Engagements

I am the author of the 2012 book *The Lost Majority: Why the Future of Government is up For Grabs and Who Will Take It.* In this book, I explore realignment theory.

It argues that realignments are a poor concept that should be abandoned. As part of this analysis, I conducted a thorough analysis of demographic and political trends beginning in the 1920s and continuing through modern times, noting the fluidity and fragility of the coalitions built by the major political parties and their candidates.

I also co-authored the 2014 *Almanac of American Politics*. Justice Kagan cites to the subsequent edition of this work, which largely repeats the district descriptions I authored in the 2014 edition, in her opinion in *Rucho v. Common Cause*. 139 S. Ct. 2484, 2510, 2521 (2019) (Kagan, J., dissenting). The *Almanac* is considered the foundational text for understanding congressional districts and the representatives of those districts, as well as the dynamics in play behind the elections. PBS's Judy Woodruff described the book as "the oxygen of the political world," while NBC's Chuck Todd noted that "Real political junkies get two Almanacs: one for the home and one for the office." My focus was researching the history of and writing descriptions for many of the newly-drawn districts, including tracing the history of how and why they were drawn the way that they were drawn. Because the 2014 Almanac covers the 2012 elections, analyzing how redistricting was done was crucial to my work.

I have also authored a chapter in Larry Sabato's post-election compendium after every election dating back to 2012. Additional publications of mine may be found in my curriculum vitae, attached as Exhibit 1.

I have spoken on the above subjects before audiences from across the political spectrum, including at the Heritage Foundation, the American Enterprise Institute, the CATO Institute, the Bipartisan Policy Center, and the Brookings Institution. In 2012, I was invited to Brussels to speak about American elections to the European External Action Service, which is the European Union's diplomatic corps. I was selected by the United States Embassy in Sweden to discuss the 2016 elections to a series of audiences there and was selected by the United States Embassy in Spain to fulfill a similar mission in 2018. I was also invited by the United States Embassy in Italy, but was unable to do so because of my teaching schedule.

1.3 Education

I graduated from Yale University with a double major in history and political science. I earned a master's degree in political science from Duke University, along with my J.D. I am currently enrolled as a doctoral candidate in political science at The Ohio State University. I have completed all my coursework and have passed comprehensive examinations in both methods and American Politics. As of this writing, my dissertation has been approved for defense by my committee and awaits formatting review. Chapter 3 of the dissertation involves the use of communities of interest in redistricting simulations. In pursuit of this degree, I have also earned a master's degree in applied statistics. My coursework for my Ph.D. and M.A.S. included, among other things, classes on G.I.S. systems, spatial statistics, issues in contemporary redistricting, machine learning, non-parametric hypothesis tests and probability theory.

In the winter of 2018, I taught American Politics and the Mass Media at Ohio Wesleyan University. I taught Introduction to American Politics at The Ohio State University for three semesters from Fall of 2018 to Fall of 2019, and again in Fall of 2021. In the Spring semesters of 2020, 2021, 2022 and 2023, I taught Political Participation and Voting Behavior at The Ohio State University. This course spent several weeks covering all facets of redistricting: how maps are drawn, debates over what constitutes a fair map, measures of redistricting quality, and similar topics.

1.4 Prior Engagements as an Expert

A full copy of all cases in which I have testified or been deposed is included on my c.v, attached as Exhibit 1. In 2021, I served as one of two special masters appointed by the Supreme Court of Virginia to redraw the districts that will elect the Commonwealth's representatives to the House of Delegates, state Senate, and U.S. Congress in the following decade. The Supreme Court of Virginia accepted those maps, which were praised by observers from across the political spectrum. *E.g.*, "New Voting Maps, and a New Day, for

Virginia," *The Washington Post* (Jan. 2, 2022), *available at* https://www.washingtonpost.com/opinions/2022/01/02/virginia-redistricting-voting-mapsgerrymandee; Henry Olsen, "Maryland Shows How to do Redistricting Wrong. Virginia Shows How to Do it Right," *The Washington Post* (Dec. 9, 2021), *available at* https://www.washingtonpost.com/opinions/2021/12/09/maryland-virginia-redistricting/; Richard Pildes, "Has VA Created a New Model for a Reasonably Non-Partisan Redistricting Process," *Election Law Blog* (Dec. 9, 2021), available at https://electionlawblog.org/?p=126216.

In 2019, I was appointed as the court's expert by the Supreme Court of Belize. In that case I was asked to identify international standards of democracy as they relate to malapportionment claims, to determine whether Belize's electoral divisions (similar to our congressional districts) conformed with those standards, and to draw alternative maps that would remedy any existing malapportionment.

I served as a Voting Rights Act expert to counsel for the Arizona Independent Redistricting Commission in 2021 and 2022.

2 Scope of Engagement

I have been retained by the Plaintiffs in the above-captioned matter to evaluate the recently enacted Congressional plan passed by the New Mexico legislature and signed by the Governor ("2021 Plan," "2021 Map," "2021 Districts", or "Enacted Map") to determine whether they are partisan gerrymanders in accordance with the order of the Supreme Court of New Mexico dated 5 July 2023. I have been retained and am being compensated at a rate of $450.00 per hour to provide my expert analysis.

3 Data Relied Upon and Construction of Datasets

For purposes of this report, I reviewed and/or relied upon the following materials:

- Justice Kagan's dissenting opinion in *Rucho v. Common Cause*;
- Block assignment files for the various plans;
- Congressional District shapefiles maintained by the University of California at Los Angeles. Lewis, Jeffrey B. , DeVine Brandon, Pitcher, Lincoln and Martis, Kenneth C. (2013) Digital Boundary Definitions of United States Congressional Districts, 1789-2012. [Data file and code book]. Retrieved from `https://cdmaps.polisci.ucla.eduonJuly11,2022`;
- Voter registration data made available by the New Mexico Secretary of State at `https://www.sos.nm.gov/voting-and-elections/data-and-maps/voter-registration-statistics/2008-voter-registration-data/`;
- Order, *Grisham v. Van Soelen*, No.S-1SC-39481 (N.M. July 5, 2023).
- Documents and data referenced in the accompanying R Code and in this Report.

Because election data are made available at the precinct level, most of the district-wide election data is accurate. When precincts are split, however, it is necessary to estimate how many votes a candidate earned from each portion of the precinct. This is accomplished by taking the precinct-wide votes for each candidate and assigning them to census blocks. Rather than dividing by the number of blocks, analysts usually weight each precinct by some number. Here, votes are assigned proportionally to the voting age population in each block. Separate sums for each portion of the precinct are then calculated by adding up the blocks in each precinct segment. Different approaches and weighting mechanisms can produce marginally different results.

All shapefiles are projected using the WGS 84 projection.

4 Summary of Opinions

Based on the work performed and addressed in the following sections of the report, I hold to the following opinions to a reasonable degree of professional certainty:

- The Enacted Map was clearly drawn to discourage competition and for the purpose of favoring the Democratic Party and disfavoring the Republican Party.
- The Enacted Map clearly had the effect of favoring the Democratic Party and disfavoring the Republican Party.

5 Methods/Guiding Principles

Before beginning the analysis, it is important to establish some guiding principles to guide the rest of the report. There are five areas covered here:

- The standard for gerrymandering, as spelled out in Justice Kagan's dissenting opinion in *Rucho v. Common Cause*;
- The standard for measuring district partisanship;
- The unique challenges of gerrymandering a competitive state with few districts;
- The regions of New Mexico discussed;
- The simulation technique employed.

5.1 Justice Kagan's Opinion

The Supreme Court of New Mexico endorsed the test laid out in Justice Kagan's dissenting opinion in *Rucho v. Common Cause*, 139 S. Ct. 2482 (2019). It did not, however, provide a detailed interpretation of that opinion. What follows is my interpretation of the most important parts of Justice Kagan's opinion. Of course, ultimate authority for the interpretation of the opinion rests with this Court and the Supreme Court of New

Mexico; this does not purport to be legal argumentation. Rather, it spells out how I proceeded in my analysis. In other words, it explains why I have done many of the things I have done in this report.

The first principle on which this report relies is one that all nine justices agreed upon in *Rucho*: "[J]udges should not be striking down maps left, right and center, on the view that every smidgen of politics is a smidgen too much." *Id.* at 2515 (Kagan, J., dissenting). Of course, Kagan's rationale for this is perhaps inapposite here, as it reflects federal courts' desire to respect state legislative processes, *id.* at 2515-16., but since the map here clearly fails this more restrictive test, the map would be unlikely to pass a test that granted New Mexico courts broader discretion to invalidate plans. Regardless, in keeping with Justice Kagan's test, the analysis here is focused on identifying only egregious gerrymanders. *See* Order 3-4, *Grisham v. Van Soelen*, No.S-1SC-39481 (N.M. July 5, 2023). ("However, as with partisan gerrymandering under the Fourteenth Amendment, some degree of partisan gerrymandering is permissible under Article II, Section 18 of the New Mexico Constitution").

Second, Justice Kagan identifies a three-part test for measuring a gerrymander: (1) intent; (2) effects; and (3) causation. *Rucho*, 139 S.Ct. at 2516-17 (Kagan, J., dissenting). Under the first prong, a court inquires whether partisanship was the predominant purpose of the maps, with a goal of "entrench[ing]" their party. *Id.* In the second prong, a court inquires whether the enacted plan substantially dilutes the plaintiffs' votes. *Id.* Finally, it allows the plaintiffs to respond to these criticisms by offering "legitimate, non-partisan justification[s]" for the partisan bias of the plan. *Id.*

The first prong of Justice Kagan's test is likely to be dependent in some degree on fact discovery, or upon facts about the redistricting process already disclosed to the public, upon which this report does not rely (indeed the author is completely unaware of the discovery sought or what fruits such discovery has borne). However, the Supreme Court of the United States has also suggested that simulation analysis may shed light on the intent of legislators. *Allen v. Milligan*, 143 S. Ct. 1487, 1518 (2023) (Kavanaugh, J., concurring) ("It is true that computer simulations might help detect the presence or absence of intentional discrimination. For example, if all of the computer simulations generated only one majority-minority district, it might be difficult to say that a State had intentionally discriminated on the basis of race by failing to draw a second majority-minority district."); *see Cooper v. Harris*, 581 U.S. 285, 317 (2017) (discussing use of an "alternative districting plan" to determine legislative intent).

Other states in which I have served as an expert witness for plaintiffs have concurred. For example, New York's Court of Appeals relied on simulations when determining the maps were drawn with "a particular impermissible intent or motive." *Harkenrider v. Hochul*, 197 N.E.3d 437, 452 (N.Y. 2022). Likewise, Maryland's Anne Arundel Circuit Court concluded, citing directly to my testimony, that the Maryland map was "drawn with 'partisanship as a predominant intent, to the exclusion of traditional redistricting criteria,' accomplished by the party in power, to suppress the voice of Republican voters." Memorandum Opinion And Order, *Szeliga v. Lamone*, No.C-02-CV-21-001773, (Md. Anne Arundel Cnty. Cir. Ct. 20212) (citations omitted) available at `https://redistricting.lls.edu/wp-content/uploads/MD-Szeliga-20220325-order-granting-relief.pdf`.

For prong 2, Justice Kagan offers a number of ways that a plaintiff may prove that a map has the effect of substantially diluting a plaintiff's vote. In particular, she noted that plaintiffs could use "advanced computing technology to randomly generate a large collection of districting plans that incorporate the State's physical and political geography and meet its declared districting criteria, except for partisan gain." *Rucho*, 139 S. Ct. at 2518 (Kagan, J., dissenting). Justice Kagan continues:

> For each of those maps, the method then uses actual precinct-level votes from past elections to determine a partisan outcome (i.e., the number of Democratic and Republican seats that map produces). Suppose we now have 1,000 maps, each with a partisan outcome attached to it. We can line up those maps on a continuum—the most favorable to Republicans on one end, the most favorable to Democrats on the other.3 We can then find the median

> outcome—that is, the outcome smack dab in the center—in a world with no partisan manipulation. And we can see where the State's actual plan falls on the spectrum—at or near the median or way out on one of the tails? The further out on the tail, the more extreme the partisan distortion and the more significant the vote dilution.

Id. (footnote omitted).

As discussed in more detail below, this analysis is primarily occupied with such simulation analysis. However, while the plaintiffs in *Rucho* offered 24,518 total maps, this report offers several million maps for analysis, using more sophisticated techniques.

Justice Kagan also endorsed a more qualitative analysis, noting that in the *Lamone v. Benisek* case arising out of Maryland – which was consolidated with the *Rucho* case for purposes of appeal – the plaintiffs lacked the North Carolina plaintiffs' "fancy evidence." *Id.* at 2521. She nevertheless observed that in Maryland, rather than engaging in a minimal changes map, the legislature "moved 360,000 residents out and another 350,000 in, while splitting some counties for the first time in almost two centuries. The upshot was a district with 66,000 fewer Republican voters and 24,000 more Democratic ones." *Id.* at 2519. While Justice Kagan noted the extreme nature of these shifts, she also noted that courts might also, as the district court below had done, find a gerrymander on the basis of "substantial" shifts. *Id.* at 2522. In keeping with this, this report pays particular attention to "evidence comparing the relevant congressional district's voter registration percentage/data, regarding the individual plaintiffs' party affiliation under the challenged congressional maps, as well as the same source of data under the prior maps." *Order*, *Grisham v. Van Soelen*, No.S-1SC-39481 (N.M. July 5, 2023).

As to the third prong, this report cannot yet respond since the state has not attempted to offer up a neutral justification for the map. However, by offering up examples of compact districts drawn without respect to anything besides traditional redistricting criteria, many of these purported justifications would fall short. Overall the simulations described below tell us "[w]hat would have happened, given the State's natural political geography and chosen districting criteria, had officials not indulged in partisan manipulation?" *Rucho*, 139 S. Ct. at 2521 (Kagan J., dissenting).

5.2 Measures of Partisanship

5.2.1 Two-Party Vote

I employ what is known as "two-party vote" throughout this report. Two-party vote shares are calculated by removing third party candidates; it is routinely employed by political scientists when analyzing elections. *See, e.g.*, Robert S. Erikson, et al., *Electoral College Bias and the 2020 Presidential Election*, 117 *Proceedings of the National Academy of Sciences* 27940 (2020).

To understand the motivation for this, consider the 1992 presidential election, where Bill Clinton won 43% of the popular vote, while George H.W. Bush won 37.5% of the popular vote. If we told most people that Michael Dukakis had received 45.65% of the popular vote in 1988, while Bill Clinton had received 43% of the popular vote in 1992, people would tend to conclude that Clinton had performed worse than Dukakis. But to accurately compare the two, we would need to remove H. Ross Perot's 19% vote share entirely from the 1992 election by taking Clinton's 43% and dividing by the total percentage received by the two major parties, i.e., 80.5% (43% + 37.5% = 80.5%). Thus, the more accurate comparison would be that Clinton won with 53.4% (43% ÷ 80.5% = 53.4%) of the two-party popular vote, compared to Dukakis' 46.1% of the two-party vote.

5.2.2 Presidential Vote Share.

Measuring the partisanship of a district can sometimes be difficult, with multiple acceptable interpretations available. This report employs two common techniques for evaluating partisanship. First, it looks at presidential vote share. This is important because, in my experience as an elections analyst, presidential vote share most strongly correlates with congressional election outcomes. While analysts sometimes average two presidential elections together, the presence of former New Mexico Governor Gary Johnson, a Republican, on the Libertarian ticket in 2016 makes that election difficult to use in New Mexico. Assuming that he drew disproportionately from Republicans, his performance may make a district seem more Democratic than it actually was, biasing the evidence against the state. This report does, however, include the 2016 election in the partisan index score, described below.

5.2.3 Partisan Index

While I mostly rely upon presidential vote share in this report, other analysts will create partisan indices by averaging across multiple races. For this analysis, I have created an average of Republican and Democratic performance across the following ten races:

- 2020 Presidential results;
- 2020 U.S. Senate results;
- 2018 U.S. Senate results;
- 2018 Gubernatorial results;
- 2018 Attorney General results;
- 2018 Secretary of State results;
- 2018 Treasurer results;
- 2018 Auditor results;
- 2018 Land Commissioner results;
- 2016 Presidential results.

I include 2016 results here in the interests of completeness, and because any distorting effect Johnson's candidacy might have would be muted by the other results.

5.2.4 Partisan Voting Index (PVI)

When referring to presidential elections, it is common to center the two-party vote on presidential vote share. The reason for this is straightforward: National environments vary; by centering on the national presidential vote share, analysts create a common baseline of a neutral environment against which to analyze the partisanship of districts.

To illustrate the motivation for this approach: In 1984, Ronald Reagan carried Massachusetts by four points. Yet it would have been a mistake to consider Massachusetts a swing state; Democrats had a 10-1 advantage in their congressional delegation, and they held overwhelming majorities in their state senate and house. The obvious problem with taking Ronald Reagan's vote share in this scenario literally is that the national environment was overwhelmingly in his favor. In a normal year with more neutral candidates, Massachusetts was still a Democratic state, as other election results demonstrated. By centering on his 59% national vote share, the partisanship of Massachusetts is shown to actually be seven points more Democratic than the country as a whole (in shorthand, we would call the state "D+7;" a Republican-leaning state or district would be referred to as "R+__").

That this allows us to make more sensible claims about a state or district is obvious as well if we look at New Mexico's performance. In 1984, Reagan won the state 59.7% to 39.23%. In 1988, George H.W. Bush won the state 51.86% to 46.9%. In 1992, however, Bill Clinton won the state 45.9% to 37.34%, while in 1996 the margin was 49.18% to 41.86%. Then, in 2000, George W. Bush narrowly lost the state, 47.85% to 47.91%. A naive observer might look at these numbers and conclude that New Mexico had radically shifted to the left and then back over these years. A more astute analyst, however, would note that Ronald Reagan was a charismatic president seeking re-election among explosive economic grown. In 1996, the shoe was on the other foot, with a charismatic Democrat running for re-election in a strong economy.

If we look at the centered numbers instead, we see that in 1984 the state was R+1, in 1988 it was D+1, in 1992 it was D+2, in 1996 it was R+1, and in 2000 it was "even." From this viewpoint, the state's politics were basically stable, with slight shifts attributable to candidate personality and other quirks.

Centered presidential election results, sometimes referred to as "Cook PVI," or just "PVI," are widely employed by elections analysts to analyze the fundamental partisanship of congressional districts, including in peer-reviewed literature and political science textbooks. *See, e.g.*, Jan Box-Steffensmeier, *et al.*, *I Get By with a Little Help from My Friends: Leveraging Campaign Resources to Maximize Congressional Power*, 64 *American Political Science Review* 1017 (2020); Benjamin Toll, *A Paradox in Polarization?: Crosspressured Representatives and the Missing Incentive to Moderate*, 182 *World Affairs* 61 (2019); Bernard L. Fraga, *Candidates or Districts? Reevaluating the Role of Race in Voter Turnout*, 60 *American Journal of Political Science* 97 (2016); Samuel Kernell, *et al.*, *The Logic of American Politics* 424 (9th ed. 2020). Given that Joe Biden won nationally by a bit over four points in 2020, it is therefore important to understand that a district he won by just a point would probably tend to favor Republicans over the long haul, since the district would be 1.5 points to the right of the country as a whole.

5.3 Extreme Gerrymandering in a Competitive State with Few Districts

Although there is not a large scholarly literature on the nature of gerrymandering in states with few districts, there are reasons to treat the gerrymandering in smaller states differently than in larger states. *E.g.*, Nicholas Stephanopoulos & Eric McGhee, *Partisan Gerrymandering and the Efficiency Gap*, 82 *U. Chi. L. Rev.* 831, 868 (2015) ("We considered congressional plans only for states that had at least eight districts at some point during this period, because redistricting in smaller states has only a minor influence on the national balance of power."); Simon Jackman, *Assessing the Current North Carolina Congressional Districting Plan*, Expert Report, *League of Women Voters v. Rucho*, (Mar. 1, 2016), available at `roseinstitute.org/wp-content/uploads`

`/2016/05/Expert-Report-of-Simon-Jackman.pdf` ("I restrict my analysis to states with seven or more Congressional districts in a given election because the efficiency gap becomes less reliable as the number of districts gets small."). This is also part of why this report does not rely upon various "partisan fairness" metrics. Aside from the fact that Justice Kagan does not reference them in her *Rucho* opinion, they are simply unreliable metrics in a state where there are only three districts.

Not only does New Mexico have relatively few congressional districts, but unlike a state like New York, it is a relatively competitive state. To be sure, it regularly elects Democrats, but the margins are often in the single digits, and it has shown a willingness to vote for Republicans.

This creates problems for a would-be gerrymanderer. Donald Trump lost the state to Joe Biden by a margin of 43.5% to 54.29%. This occurred in a year that he lost the national popular vote 46.8% to 51.3%. To walk through our PVI analysis above, Trump's two-party vote share nationally was 47.7% (46.8 ÷ (46.8% + 51.3%)). His two-party vote share in the state was 44.5% (43.5% ÷ (43.5% + 54.29%)). Thus, New Mexico had a PVI that year of D+3 (44.5% - 47.7%).

Thus, the best-case scenario for a gerrymanderer would be drawing three districts that President Biden won by around 11 points. As noted above, we would call these "D+3" districts. Democrats would be favored in such districts; Republicans currently occupy only five districts with a PVI of D+3 or more.

But powerful incumbents may not wish to risk even this degree of competitiveness, and may ask for safer districts. The problem is that redistricting is a zero-sum game: To shift the partisan composition of a district, a mapmaker must inevitably rob Peter to pay Paul. That is to say, every Republican moved out of a Democratic district has to be moved into a neighboring one. Then, to comply with equal population requirements, to create a net change in partisanship a Democrat must be moved out of the Republican district and into the Democratic one. Thus, making one district more Democratic inevitably entails making some other district more Republican.

Consider the hypothetical scenario provided below, in a state where the 2020 presidential performance is very similar to that of New Mexico's in 2020: The Democrat wins statewide with 1,650 votes to 1,350 votes, which works out to a 10-point victory. To make the math simple, assume something akin to the national result in 2020, where the Democrat wins by four points. The best gerrymander a mapmaker could draw in theory would be three districts that voted for the Democrat by ten points.

Sample Redistricting in a Three-District State

Party	District 1	District 2	District 3	Total
		Scenario 1		
R	450	450	450	1,350
D	550	550	550	1,650
		Scenario 2		
R	460	445	445	1,350
D	540	555	555	1,650
		Scenario 3		
R	470	440	440	1,350
D	530	560	560	1,650

These districts would be D+3: The Republican received 48% of the two-party vote nationally, while receiving 45% of the two-party vote in the districts. These districts would all tend to vote for the Democrats, but it might be tight in the best Republican years. For whatever reason then, assume that the mapmaker decided to make districts two and three a point more Democratic by moving five Democrats into each, and five Republicans out. Because redistricting requires you to rob Peter in order to pay Paul, those voters must come from somewhere, and go somewhere respectively. The only option is District 1, which then becomes one the presidential candidate won by 8 points. Thus, because the Democratic presidential candidate won districts two and three with 55.5% of the vote, they are D+4 (55.5% - 52% = 3.5%). District 1, however, is now D+2 (54%

- 52% = 2%).

Continuing with this example, suppose that an additional 0.5% of the Republican voters were moved out of two districts and into a third district, while at the same time two sets of 0.5% of the Democratic voters were moved out of the third district and into the other two districts. We then have two districts the Democratic presidential candidate won by 12 points, and one that he won by six. In this scenario, the first district would be competitive, but we would still be close to the platonic ideal of a gerrymander in the state as described in the first example .

In a more Democratic state like New York, with many Congressional districts, this is not an issue. First, there are more districts to spread voters across, so ten Republicans being moved out of two districts wouldn't necessarily mean that you would give an adjacent district twenty Republicans; those Republicans can be diluted across several districts.

Second, there are more Democrats in New York. A district doesn't have to go 90% for Biden to be safe for the Democrats; if 20% of the Democrats are moved out of two 90% Biden districts into an adjacent 80% Trump district, and are offset by Republicans going the other way, we are left with two 70% Biden districts and one 60% Biden district.

In short, an extreme gerrymander in New Mexico won't look exactly like an extreme gerrymander in a state like New York. The margins will appear much closer, even as the map remains an outlier with respect to the state's partisanship.

5.4 Regions of New Mexico Utilized

It is at times useful to refer to changes in a state's map by region. This is particularly true in New Mexico, where the changes in the map are limited to discrete areas of the state. In this type of analysis, one must often choose among different interpretations of the state's geography. For this report, I have opted to use the state's own definition of regions as described by the state's Tourism and Travel board. New Mexico Tourism Department, Regions & Cities `https://www.newmexico.org/`;

https://www.newmexico.org/places-to-visit/regions/. Under this approach, the regions are defined as follows:

- **Northwest**: San Juan, McKinley, and Cibola counties;
- **North Central**: Rio Arriba, Taos, Los Alamos, and Santa Fe counties;
- **Central**: Sandoval, Bernalillo, Valencia, and Torrance counties;
- **Northeast**: Colfax, Union, Harding, Mora, San Miguel, Guadalupe, and Quay counties;
- **Southwest**: Socorro, Catron, Grant, Sierra, Doña Ana, Luna and Hidalgo counties;
- **Southeast**: Curry, Roosevelt, Lee, Eddy, Chaves, De Baca, Lincoln and Otero counties.

5.5 Simulation Analysis

Political scientists and mathematicians have been designing simulation analyses for electoral districts for over 60 years. See, e.g., William Vickery, *On the Prevention of Gerrymandering*, 76 *Political Science Quarterly* 105 (1961). The techniques have developed over time and have become more complex as computational power has increased; even since the *Rucho* case was tried, the number of maps that could feasibly be produced by simulations have moved from the thousands into the trillions. For this report, I have employed a broadly accepted "package" in R called "redist," which generates a representative sample of districts. *See, e.g.*, Benjamin Fifeld, et al., *Automated Redistricting Simulation using Markov Chain Monte Carlo*, 29 *Computational & Graphical Statistics* 715 (2020); Cory McCartan & Kosuke Imai, *Sequential Monte Carlo for Sampling Balanced and Compact Redistricting Plans*, *Annals of Applied Statistics*, Forthcoming.

There are a variety of proposed simulation techniques, but they all proceed from the same basic principle: precincts are aggregated together in a random fashion, potentially subject to a variety of parameters, to form districts in hundreds or thousands of maps. This creates an "ensemble" of maps that reflect what we would expect in a state if maps were drawn without respect to partisan criteria. In other words, the simulations "randomly generate[] a large collection of districting plans that incorporate the State's physical and political geography and meet its declared districting criteria, except for partisan gain," as discussed by Justice Kagan in *Rucho*. Rucho, 139 S. Ct. at 2518 (Kagan, J., dissenting). If the map is drawn without partisan intent, its partisan features should match those that appear in the ensemble. The more the map deviates from what we observed in the ensemble, the more likely it becomes that partisan considerations played a heavy role.

To better understand how this works, imagine the following cluster of seven hexagons as a cluster of precincts, with each hexagon representing an individual precinct. The precincts are connected when they share adjacent sides. Those adjacencies are reflected in the image below by the lines that connect the hexagons (called, somewhat counterintuitively, "edges"). The top precinct therefore shares a border with the center, top right, and top left precincts; the top left hexagon shares a border with the top, center, and bottom left precincts; and so forth.

It is possible, however, to "break" adjacencies, using the computer, by removing one of these lines. One can continue to do so until there is only one path from any precinct to any other precinct. This is called a "spanning tree," *e.g.*, J.B. Kruskal, *On the Shortest Spanning Tree of a Graph and the Traveling Salesman Problem*, 7 *Proc. Amer. Math Soc.* 48 (1956), and it lies at the heart of the Sequential Monte Carlo (SMC) redistricting algorithm.

For sets of more than two precincts, there will almost always be multiple spanning trees, but the number of such trees is finite. I have illustrated two such trees for our cluster of seven hexagons.

Figure 1: Cluster of precincts with example spanning trees superimposed.

Once you have reduced the number of connections between precincts to a minimum, removing one additional connection will create two distinct clusters of precincts. This is exactly what a district is: a collection of contiguous (adjacent) precincts that are separated from other precincts on the map. In the following illustration I have removed the connection between the center hexagon and the lower right hexagon, and then illustrated the two districts this creates in the right panel.

Figure 2: Cluster of precincts with edge removed from spanning tree, creating two districts.

This, then, is a microcosm of the approach that the SMC algorithm takes. To simplify greatly, by sampling spanning trees of New Mexico's precincts and then removing two connections, the software produces three randomly drawn districts. While the math is quite complicated, this approach produces a random sample of maps that mirrors the overall distribution of possible maps, similar to the way a high-quality poll will produce a random sample of respondents that reflects the overall population. While the process is complicated, it can be run on a laptop computer. Indeed, these simulations were run at home on a Dell Alienware desktop computer with an i9 processor and128M of RAM, using a free, widely employed, computer programming language (R version 4.1.2).

Importantly, these maps are drawn without providing the software with any political information. In other words, these maps help inform an analyst what maps would tend to look like in New Mexico if they were drawn without respect to politics.

Of course, other features, such as respect for county lines, compactness, or respect for geographic features could play a role in the drawing of district lines as well; these traditional redistricting criteria are almost always viewed as valid considerations by courts. To account for this, when removing the connections that create districts, the algorithm can be instructed to favor the removal of connections that will result in districts that remain within specified parameters when deciding which connections to remove. It can be instructed to remove connections in such a way that equally populated districts will be created, or to prefer breaks that will create compact districts, or will respect county boundaries, or any number of other factors.

Here, the simulation was instructed to follow federal and state law by drawing districts that will be largely equipopulous. The simulation allows a population tolerance of +/- 1%. This is because the simulations cannot split precincts, and because Bernalillo County in particular has heavily populated precincts (the mean population of a precinct in Bernalillo County is 984 residents). Curry County has two precincts with populations exceeding 2,000 residents. This is a reasonable allowance not because we assume a court would accept this deviation, but rather because reducing the population deviations in these districts by splitting precincts at the block level can almost always be achieved, but cannot alter the political orientation of these districts substantially. In fact, in my experience drawing redistricting maps, this is exactly how mapmakers proceed: the general layout of the maps is agreed upon first, while the time-consuming process of 'zeroing-out' districts is saved until later. *See* Bernard Grofman & Sean Trende, Memorandum to the Chief Justice and Justices of the Supreme Court of Virginia Re: Redistricting Maps, at 8, Dec. 27, 2021, *available at* `https://www.vacourts.gov/courts/scv/districting/2021_virginia_redistricting_memo.pdf`. Political scientists have generally accepted this concept to the simulated approach as well. See Jowei Chen & Jonathan Rodden, Unintentional Gerrymandering: Political Geography & Electoral Bias in Legislatures, 8 *Quar. J. Pol. Sci. 239*, 250 (2013) (accepting 5% deviations).

Finally, federal and state courts have accepted this limitation in the simulations. *See* Expert Report of Kosuke Imai, Dec. 9, 2021, *League of Women Voters of Ohio v. Ohio Redistricting Commission*, No. 2021-1449 (Ohio 2021) ("For all simulations, I ensure districts fall within a 0.5% deviation from population parity. Although this deviation is greater than the population deviation used in the enacted plan, it only accounts for less than 4,000 people and hence has no impact on the conclusions of my analysis."); Wesley Pegden, "Pennsylvania's Congressional Districting is an Outlier: Expert Report," Nov. 27, 2017, *League of Women Voters of Pennsylvania v. Wolf*, at 3-4 (Pa. 2018) (employing a 2% threshold and explaining that a 1% would be sufficient to replicate what we might expect from a 0% threshold).

6 Analysis of Districts

With this background in place, we can finally move on to the analysis of the 2021 congressional districts. These are examined below.

6.1 Politics of New Mexico

The following maps trace the political development of New Mexico over the past 40 years. Each map shades the counties in New Mexico by their PVI, with an overlay of the relevant regions in place. Note that these maps do not employ the traditional red/blue color scheme. This is not meant to confuse, instead it reflects two realities: (1) that color-blind people (such as myself) do not read shades of red well and (2) red/blue maps do not print out well on a black-and-white printer. The "Viridis" color package I employ addresses both issues well.

Figure 3: Presidential Vote Share, Centered, By County and Region, 1984 (left), 1988 (right).

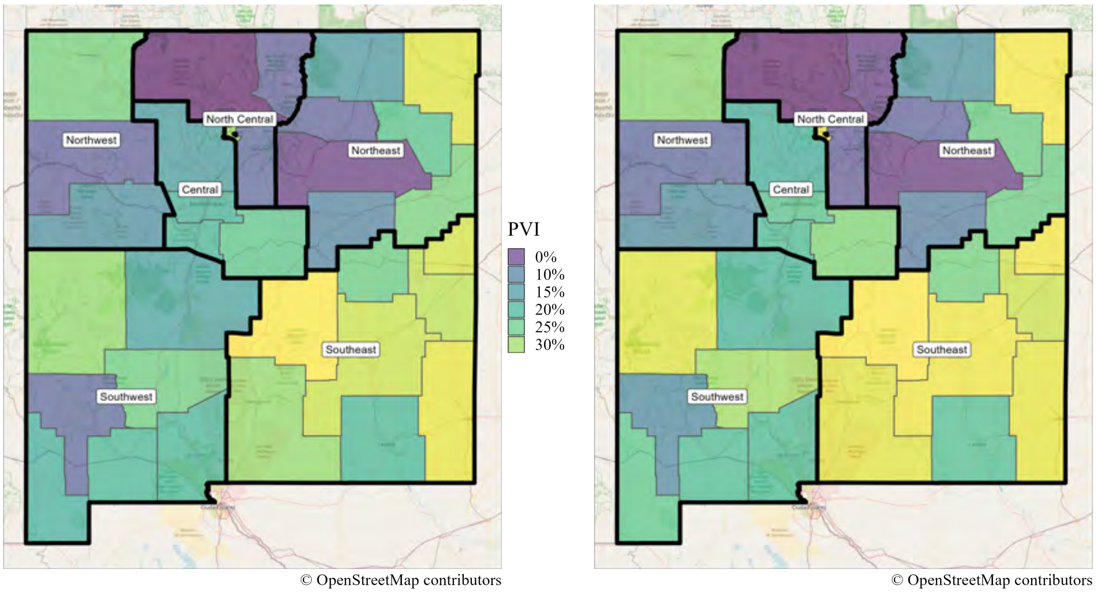


Figure 4: Presidential Vote Share, Centered, By County and Region, 1992 (left), 1996 (right).

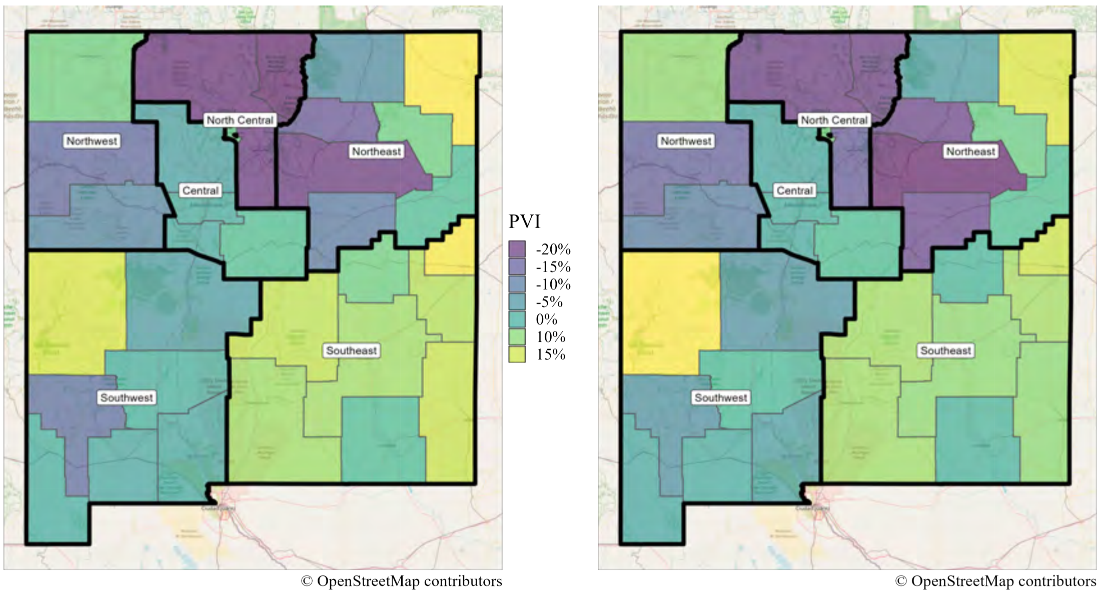


Figure 5: Presidential Vote Share, Centered, By County and Region, 2000 (left), 2004 (right).

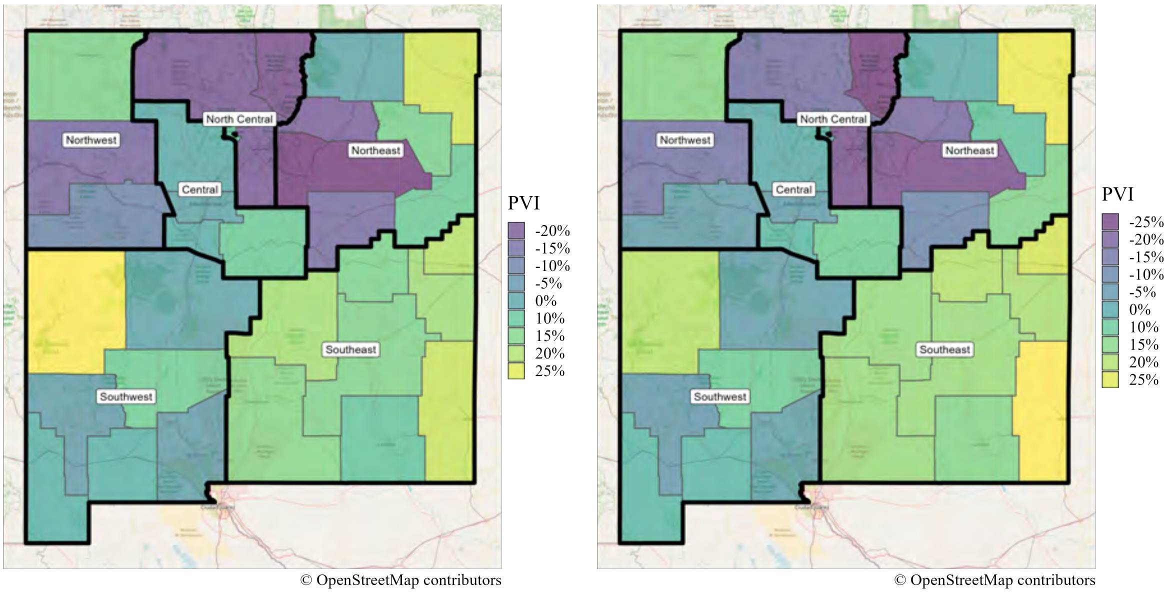


Figure 6: Presidential Vote Share, Centered, By County and Region, 2008 (left), 2012 (right).

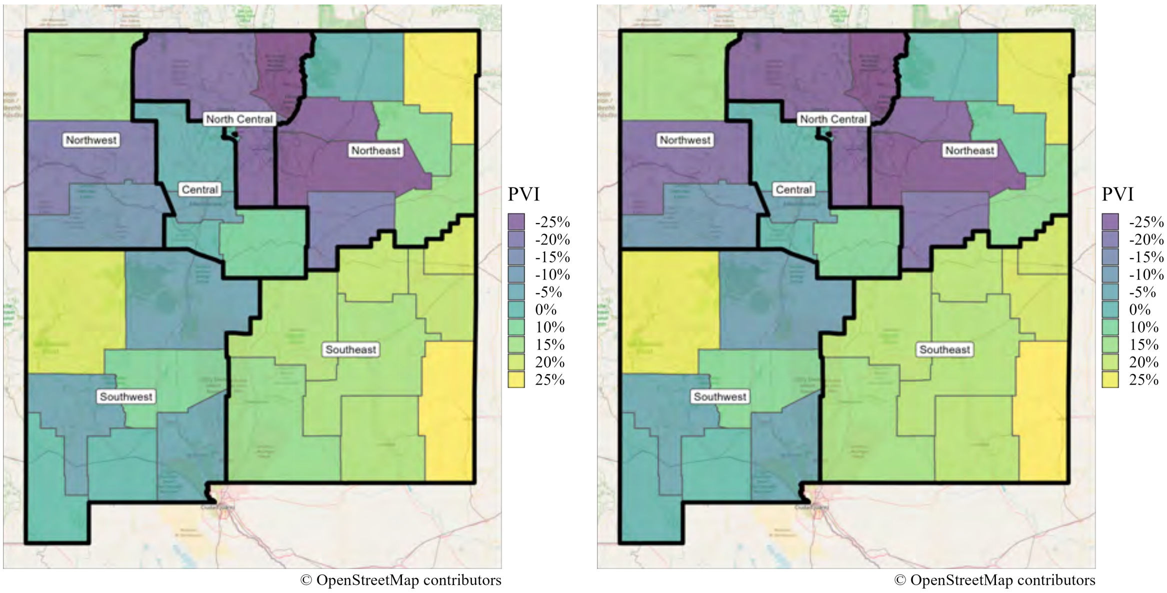
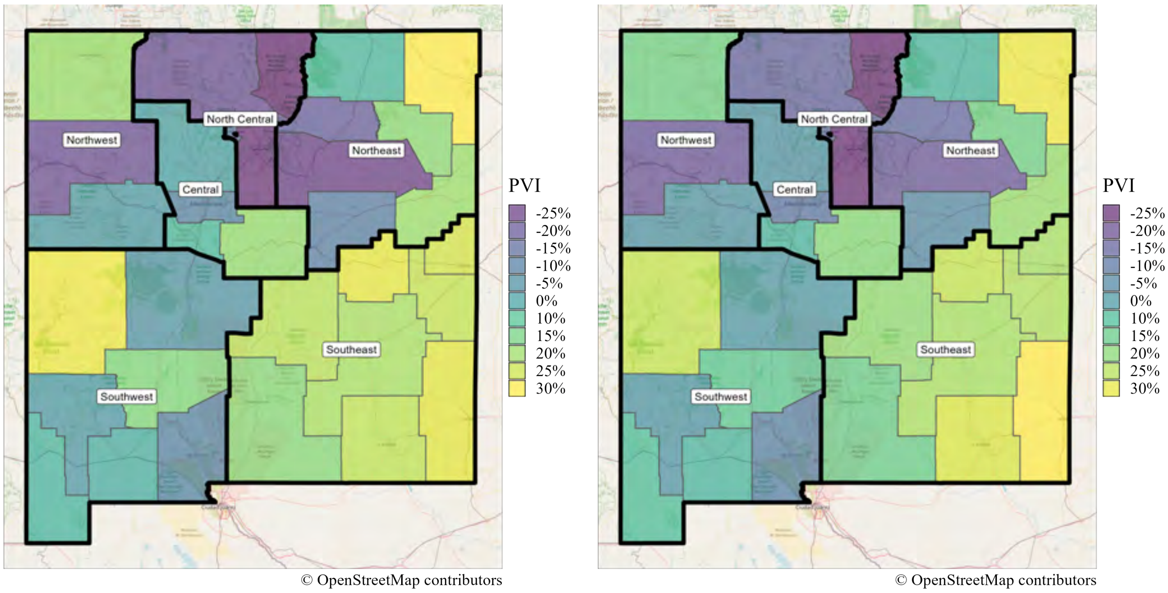
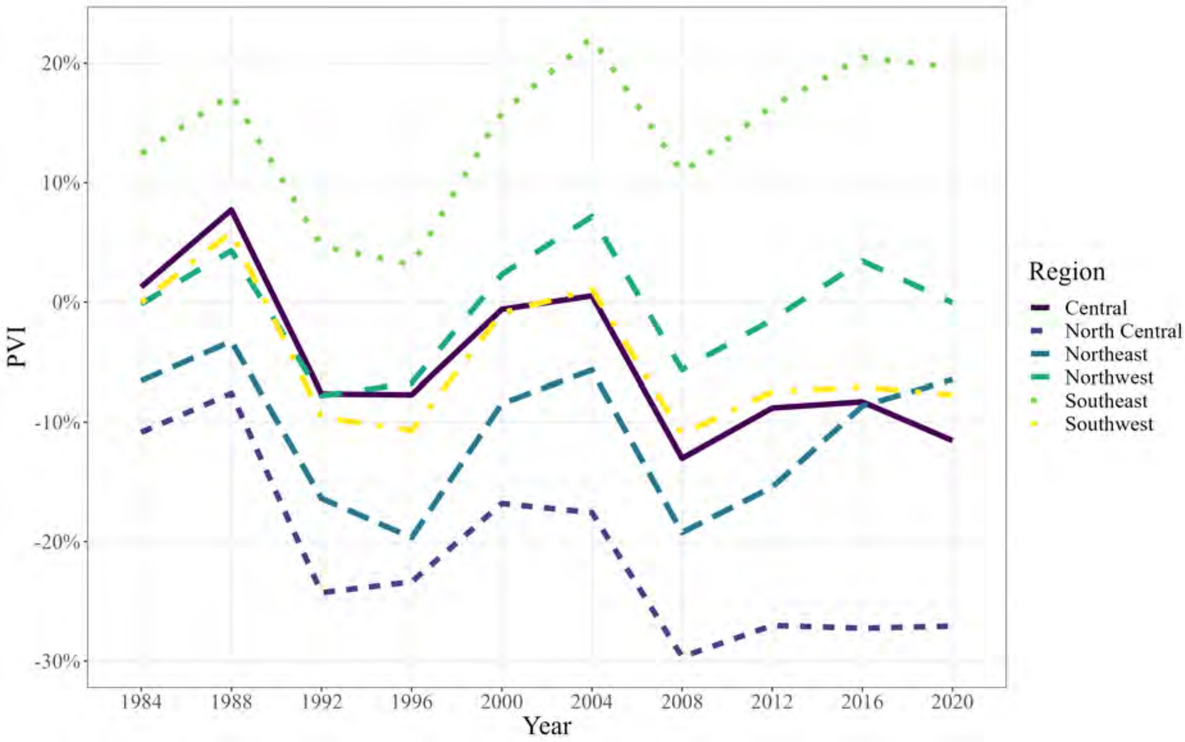


Figure 7: Presidential Vote Share, Centered, By County and Region, 2016 (left), 2020 (right).



The most striking thing about these maps is the overall stability of the regions. The Southeast region is consistently the most heavily Republican region of the state, while the North Central is the most heavily Democratic region. The Central region has moved significantly toward the Democrats over this time period, and is the most populous region.

Figure 8: PVI of New Mexico Regions, 1984-2020.

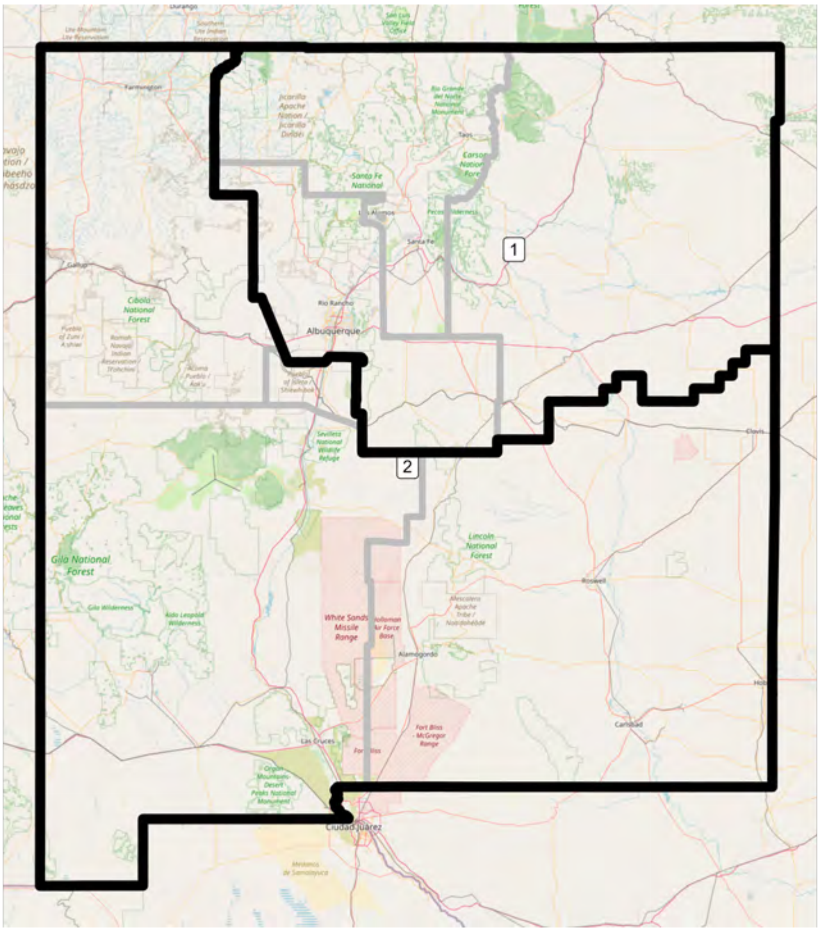


A would-be gerrymanderer wishing to maximize Democratic strength would therefore likely have two goals: To split up the North Central and Central regions in such a way as to spread Democratic voters to other districts, while cracking the southeast to dilute the Republican concentration of voters there. Because the regions are, overall, close to politically neutral, they are not as important when changing the partisan composition of districts.

6.2 New Mexico's Congressional Districts, 1972 to 2020

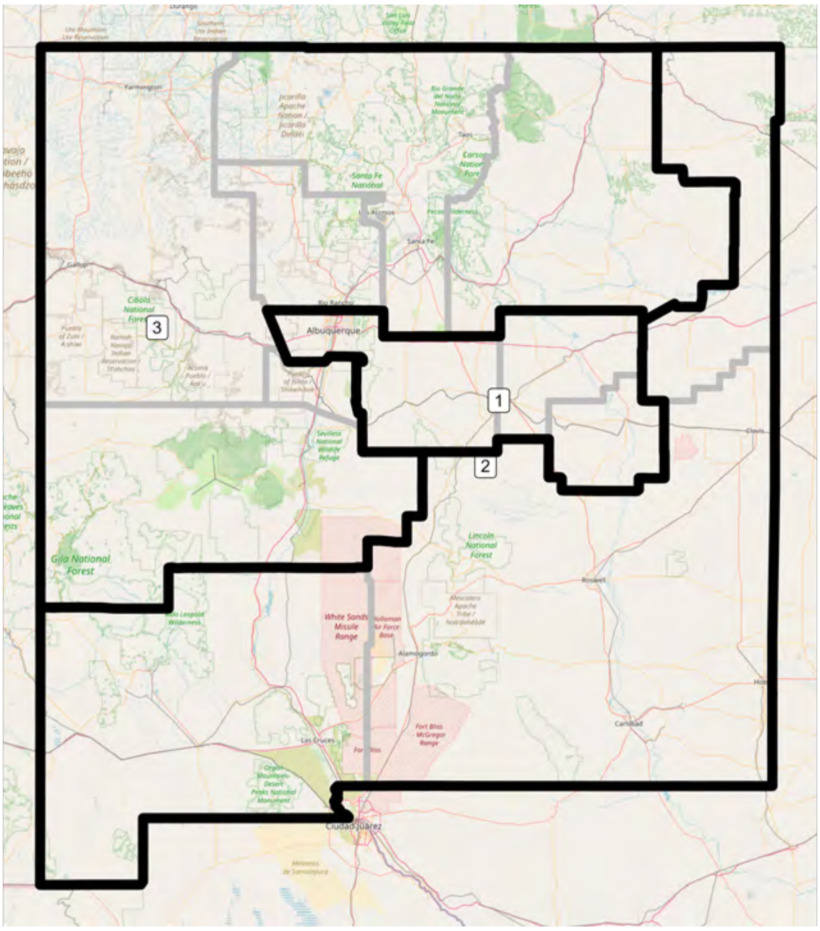
New Mexico was awarded a second congressional district in the wake of the 1940 census, however it elected its representatives at large until the 1960s. Its first set of congressional districts actually followed the contours of the state's regions nicely, with the first district taking in the Northeast, North Central, and Central regions and the 2nd District taking in the rest.

Figure 9: New Mexico Congressional Districts, 1972. Grey Lines = Regions



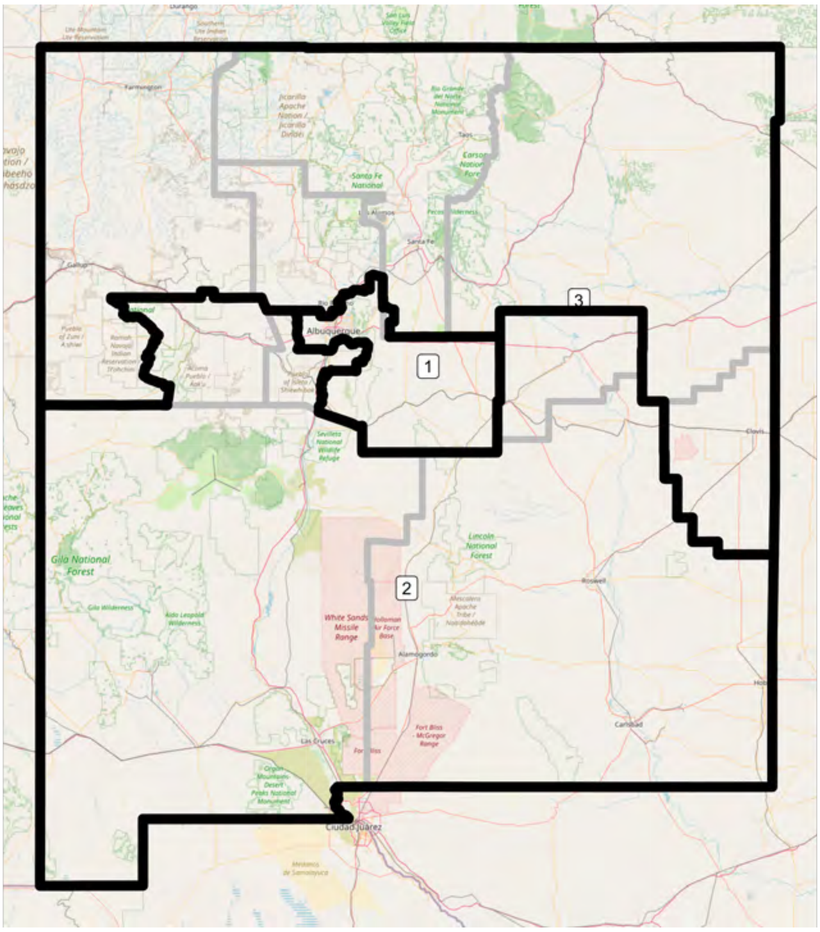
In 1982, New Mexico gained a congressional district. The resulting map showed less respect for New Mexico's regions, dividing the Central and Northeastern regions up three ways. The Southeastern and Southwestern regions were split as well, although only a single county was taken out of the Southeastern region.

Figure 10: New Mexico Congressional Districts, 1982. Grey Lines = Regions



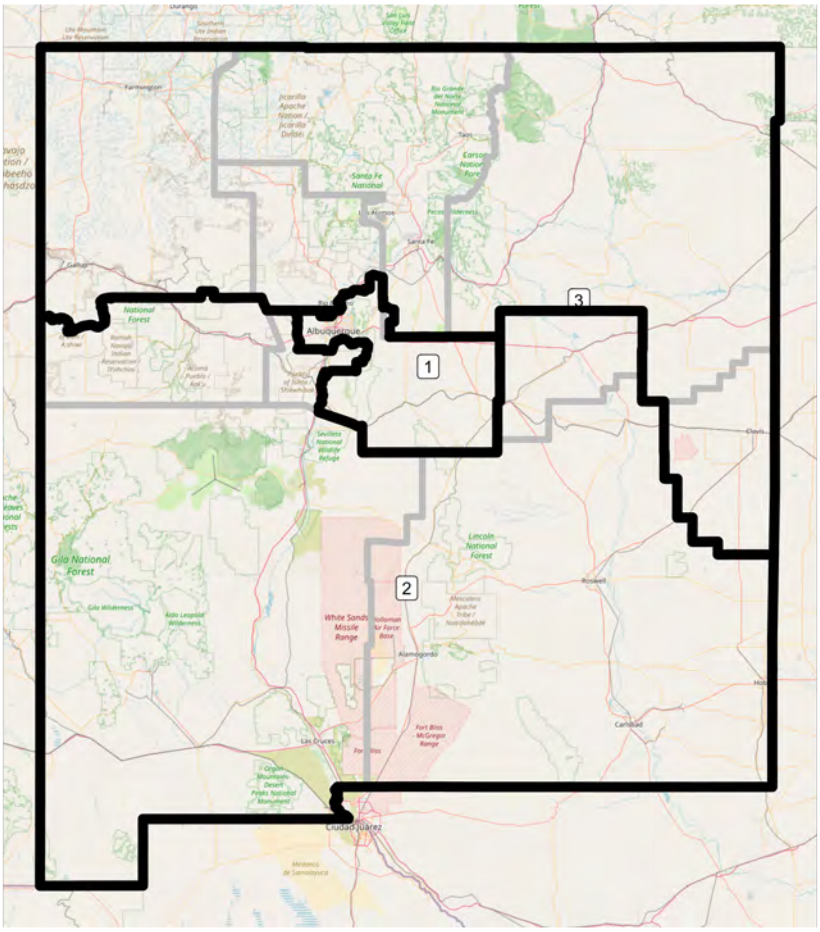
Subsequent redistrictings, however, involved more respect for the state's regions outside of the central region (which has always been shared among the state's three districts, though the Albuquerque metro area has not been). In 1992, single counties were taken out of the Northeastern, Southeastern and Northwestern regions.

Figure 11: New Mexico Congressional Districts, 1992. Grey Lines = Regions



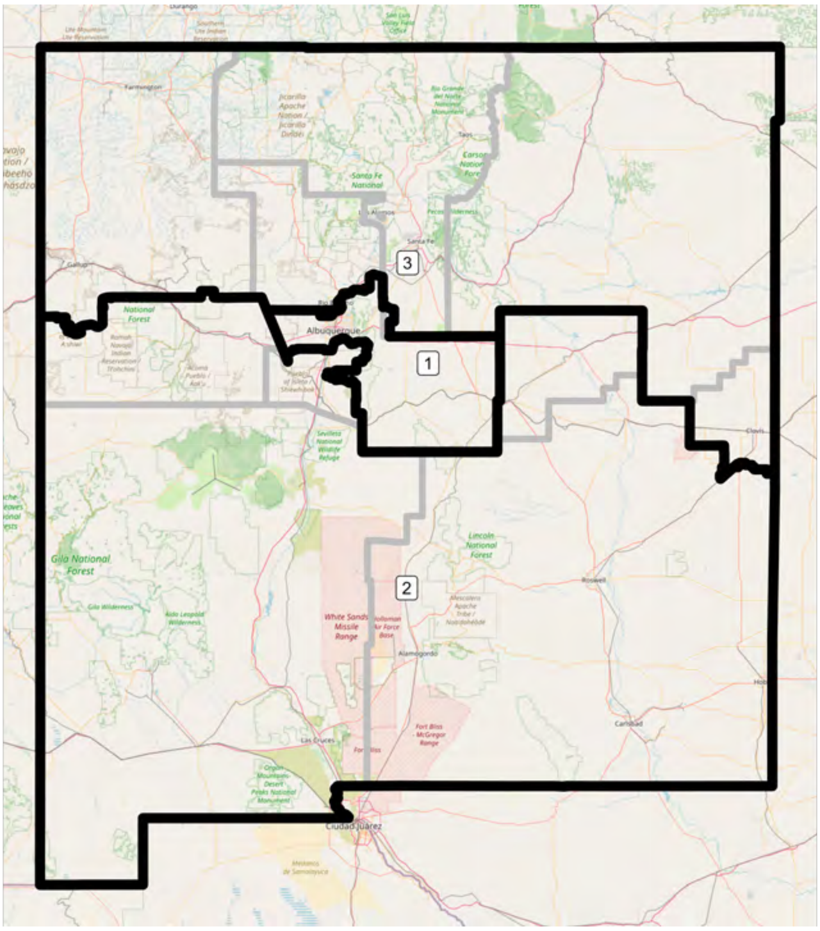
The 2002 lines largely paralleled the 1992 lines, with an additional county moved from the 3rd district into the 2nd in the Northeastern region.

Figure 12: New Mexico Congressional Districts, 2002. Grey Lines = Regions



The 2012 lines once again involved only modest changes from the 2002 lines.

Figure 13: New Mexico Congressional Districts, 2012. Grey Lines = Regions



In other words, New Mexico's lines have been more-or-less stable over the course of the past three redistricting cycles. Moreover, the state has typically provided a regional basis for the state's districts. We next turn to the 2021 redistricting, which took a very different turn.

6.3 Qualitative Analysis of the 2021 Redistricting

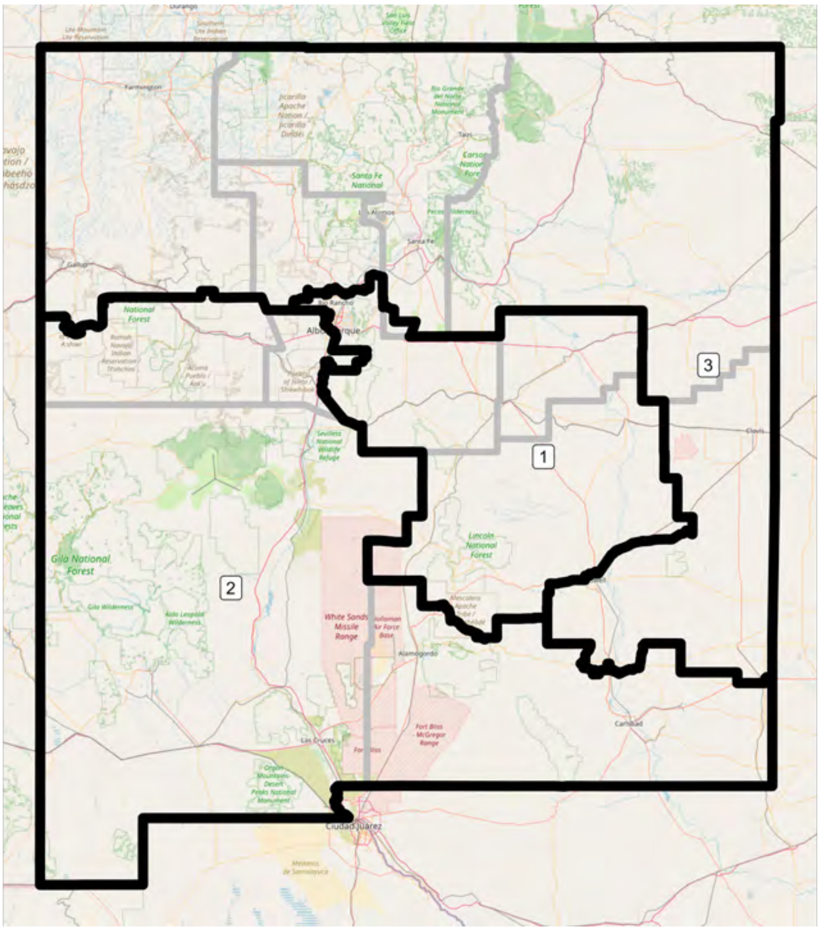
By the end of the 2010s, New Mexico's congressional district lines were malapportioned and had to be redrawn to meet the Constitution's one-person-one-vote requirement. However, only minimal changes were required.

Population Deviation of 2012-2020 Lines				
District	**Population**	**Ideal**	**Difference**	**Percent**
1	694,577	705,841	−11,264	−1.6%
2	714,022	705,841	8,181	1.2%
3	708,923	705,841	3,082	0.4%

The First District was underpopulated, but only had to gain 11,264 residents. The Second district was the most heavily overpopulated, but only had to lose 8,181 residents. The Third district was slightly overpopulated, and had to give up 3,082 residents. Overall, no district was even two percentage points off from the ideal population.

Instead, mapmakers substantially altered the map for the first time in decades. In particular, the 1st and 3rd districts were pushed into Southeastern New Mexico, while the 2nd was shifted substantially into Bernalillo County:

Figure 14: New Mexico Congressional Districts, 2022. Grey Lines = Regions



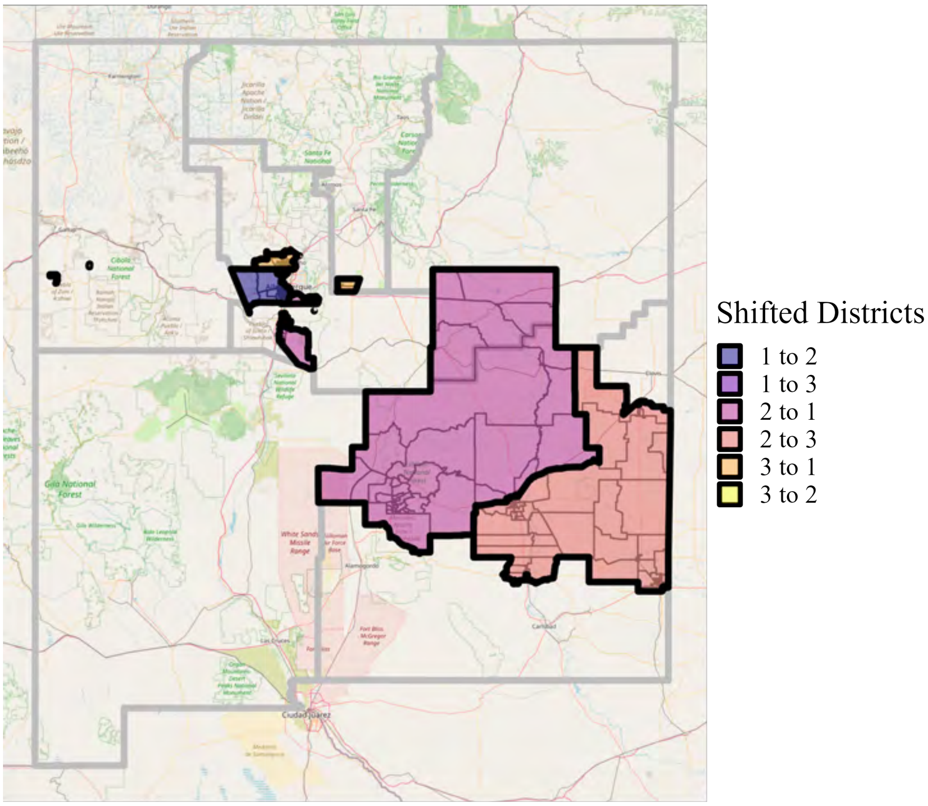
Overall, 505,952 residents were shifted between districts, more than twenty times the number of residents that had to be shifted to meet equal population requirements. Although the 1st District had to gain population, it shifted 166,485 residents to District 2. It did not, however, shift any residents to District 3. The 3rd District had to give up just 3,082 residents, but it gave 21,292 residents to District 2 and 122, 222 residents to District 1.

Most importantly, while the 2nd District only had to give up 8,181 residents, it gave up 55,518 residents to the 1st District and 140,435 residents to the 3rd District (which, recall, had to lose population).

Allocation of 2020 Population to 2020 Districts		
2020 District	**2022 District**	**Population**
1	1	528,092
1	2	166,485
1	3	0
2	1	55,518
2	2	518,069
2	3	140,435
3	1	122,222
3	2	21,292
3	3	565,409

These shifts, moreover, were not randomly distributed. They were concentrated in two regions of the state: The Southeastern and Central regions:

Figure 15: Location of Shifted Precincts, 2020-2022. Grey Lines = Regions



In the heavily Republican Southeastern Region, the population was shifted out of the 2nd District and into the 1st and 3rd Districts, splitting the region between three districts for the first time in the state's history. This is balanced out in the central region, where a large population is shifted into the 2nd from the 3rd. A few blocks are shifted from the 3rd to the 2nd in Northwestern New Mexico.

Perhaps most importantly, these shifts were not politically neutral. On balance, 16,216 votes for President Biden were transferred out of the First District and into the Second, while 805 were shifted from the Third District into the Second, for a gain of 17,021 Biden votes. At the same time, a net of 6,640 Trump votes were shifted from the Second District to the First, while 23,976 Trump votes were shifted from the Second

District to the Third. On balance, the Second District netted approximately 40,000 Democratic votes.

Recall that only 23,000 residents needed to be transferred. However, many of these residents did not even vote, either because they were not yet 18, were not yet citizens, or simply chose not to vote. In other words, the number of *votes* that had to be shifted between districts would be much smaller than 23,000.

Shift of 2020 Presidential Votes, 2020 - 2022

2020 District	2022 District	Trump Votes Shifted	Biden Votes Shifted	Net D Shift
1	2	19,862	36,078	16,216
1	3	0	0	0
2	1	16,397	9,757	−6,640
2	3	34,871	10,895	−23,976
3	1	29,997	30,181	184
3	2	4,685	5,490	805

The same is true if we look at our index of elections. Note that since this reflects a collection of ten elections, the total number of votes is much larger than using the presidential election alone. If, however, we divide the net D shift by ten, the numbers reflect what we see at the presidential level:

Shift of 2016-2020 Statewide Votes, 2020 - 2022				
2020 District	2022 District	R Votes Shifted	D Votes Shifted	Net D Shift
1	2	138,386	273,263	134,878
1	3	0	0	0
2	1	127,282	80,349	−46,934
2	3	254,682	91,511	−163,172
3	1	229,408	221,246	−8,162
3	2	34,837	37,214	2,378

We can also examine this by looking at party registration data, made public by the New Mexico Secretary of State's office. As the following table demonstrates, the percentage of registered voters who are registered as Republicans and Democrats in a given district tends to shift only gradually over time, and rarely shifts in a redistricting year. Between 2000 and 2002, the Democratic registration advantage dropped 0.3% in District 1, 0.2% in District 2, and increased by 1.4% in District 3.

Between 2010 and 2012, the Democratic registration advantage declined by 0.2% in District 1, 3.1% in District 2, and 1.6% in District 3. All told, there is a gradual decline in the Democrats' advantage in District 2 and, to a lesser extent, in District 3 between 1998 and December of 2021. This is offset by a gradual trend toward the Democrats in District 1.

By December of 2021, Republicans had gained a slight registration advantage in District 2, something not achieved in this state in any district in the 23 years prior. This changes in January 2022, when the new districts are put into place. Here we see the most radical registration shifts of any in interval in our time series.

Registration Numbers, New Mexico, By Congressional District, 1998-2022[1]

Year	Dem. Dist 1	Rep. Dist 1	Other Dist 1	Dem. Dist 2	Rep. Dist 2	Other Dist 2	Dem. Dist 3	Rep. Dist 3	Other Dist 3	Dem Adv., Dist 1	Dem Adv., Dist 2	Dem Adv., Dist 3
1998	151,947	114,448	46,601	154,506	98,325	33,338	184,884	87,571	40,509	12.0%	19.6%	31.1%
2000	156,935	118,544	56,380	158,032	104,529	40,025	193,447	95,209	50,432	11.6%	17.7%	29.0%
2002	147,746	112,262	53,512	153,281	101,796	39,220	187,559	89,140	47,073	11.3%	17.5%	30.4%
2004	174,849	131,945	75,628	164,040	118,830	54,467	211,630	108,788	65,195	11.2%	13.4%	26.7%
2006	170,883	130,935	73,160	159,731	119,117	55,246	207,857	108,773	63,273	10.7%	12.2%	26.1%
2008	200,011	136,130	82,584	169,797	126,155	64,301	223,496	113,033	68,435	15.3%	12.1%	27.3%
2010	198,444	135,709	84,791	156,357	119,326	61,351	215,385	112,539	68,407	15.0%	11.0%	25.9%
2012	205,908	139,985	100,518	165,580	135,687	78,754	224,719	120,409	83,708	14.8%	7.9%	24.3%
2014	207,152	140,089	108,123	166,045	139,248	87,656	227,403	122,602	91,497	14.7%	6.8%	23.7%
2016	216,202	138,902	110,904	158,447	138,783	87,076	225,031	122,164	90,988	16.6%	5.1%	23.5%
2018	201,125	123,889	110,089	154,583	138,821	92,977	225,399	120,756	98,189	17.8%	4.1%	23.5%
2020	216,776	132,089	113,513	159,568	157,876	99,816	234,158	132,552	103,826	18.3%	0.4%	21.6%
2021[2]	214,071	128,151	116,507	155,432	155,608	103,432	230,014	130,036	107,964	18.7%	−0.0%	21.4%
2022[3]	224,149	175,940	130,215	177,047	124,125	105,789	210,204	132,297	100,784	9.1%	13.0%	17.6%
2022[4]	213,816	160,193	124,411	177,638	128,006	108,423	210,977	135,712	102,845	10.8%	12.0%	16.7%

[1] Data taken from NM Sec. of State Website for release immediately prior to election, except where noted.
[2] Data are from December of 2021.
[3] Data are from January of 2022.
[4] Data are from November of 2022.

The 1st District gained 10,078 registered Democrats, 47,789 registered Republicans and 13,708 registered Independents. The Democratic advantages here dropped from 18.7% to 9.1%. At the same time, Democratic registration in the 3rd District dropped by 19,810, while the number of registered Republicans increased by 2,261. The Democratic advantage dropped from 21.4% to 17.6%

With the Democrats' advantage declining in two of the state's congressional districts, these voters could only go into the 2nd District. And indeed, the Republicans' nascent registration advantage here was obliterated. This district added 21,615 Democratic registrants, while giving up 31,483 Republican registrants. When the redistricting dust had cleared, the Democrats enjoyed a 13% registration advantage in the district – the largest advantage here since the mid-2000s. This is easier to see in chart form:

Figure 16: Dem. Registration Advantage, New Mexico 1st Congressional District, 1998-2022

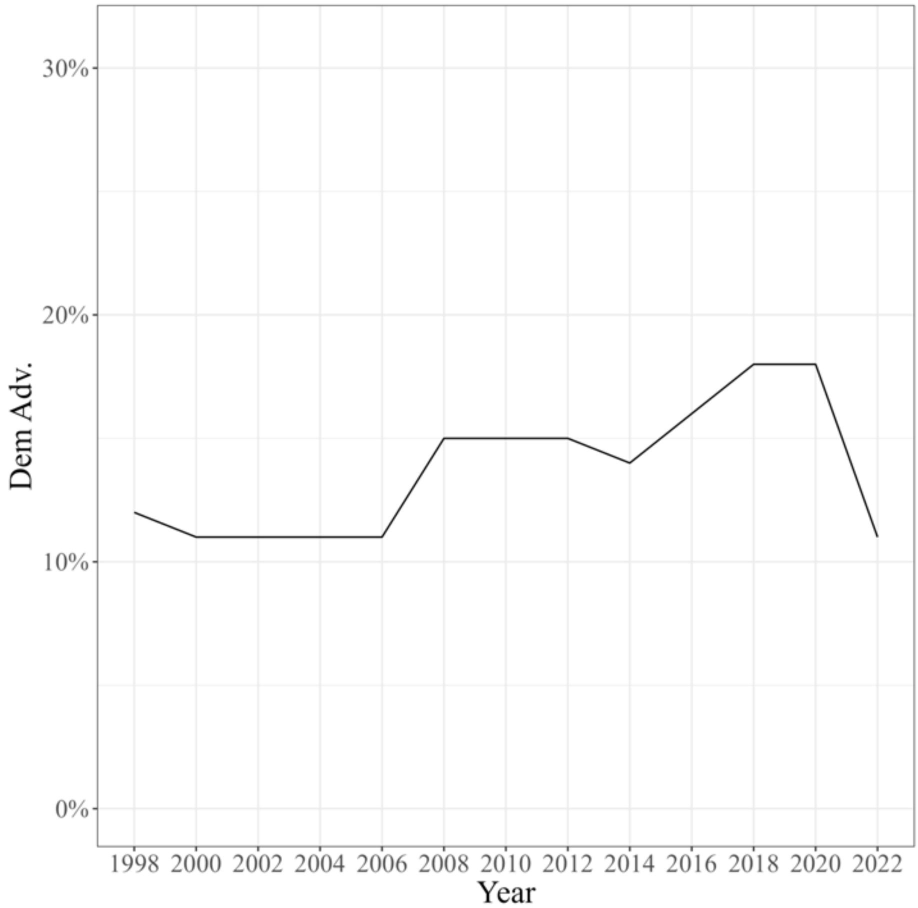


Figure 17: Dem. Registration Advantage, New Mexico 2nd Congressional District, 1998-2022

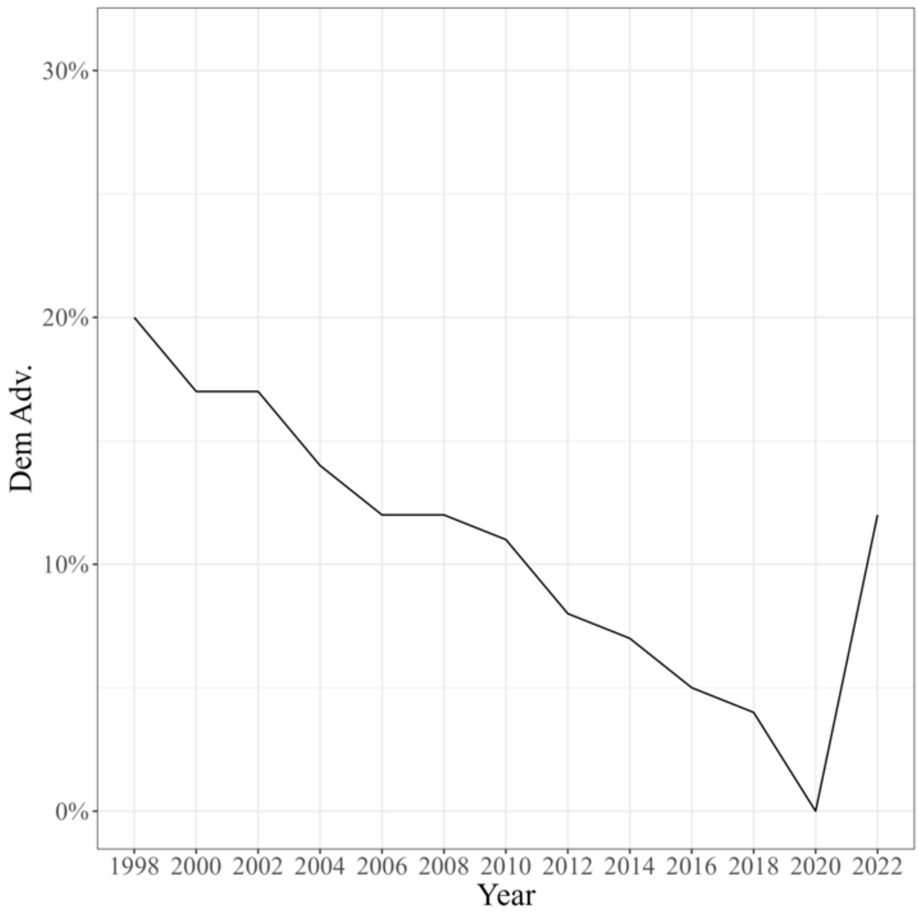
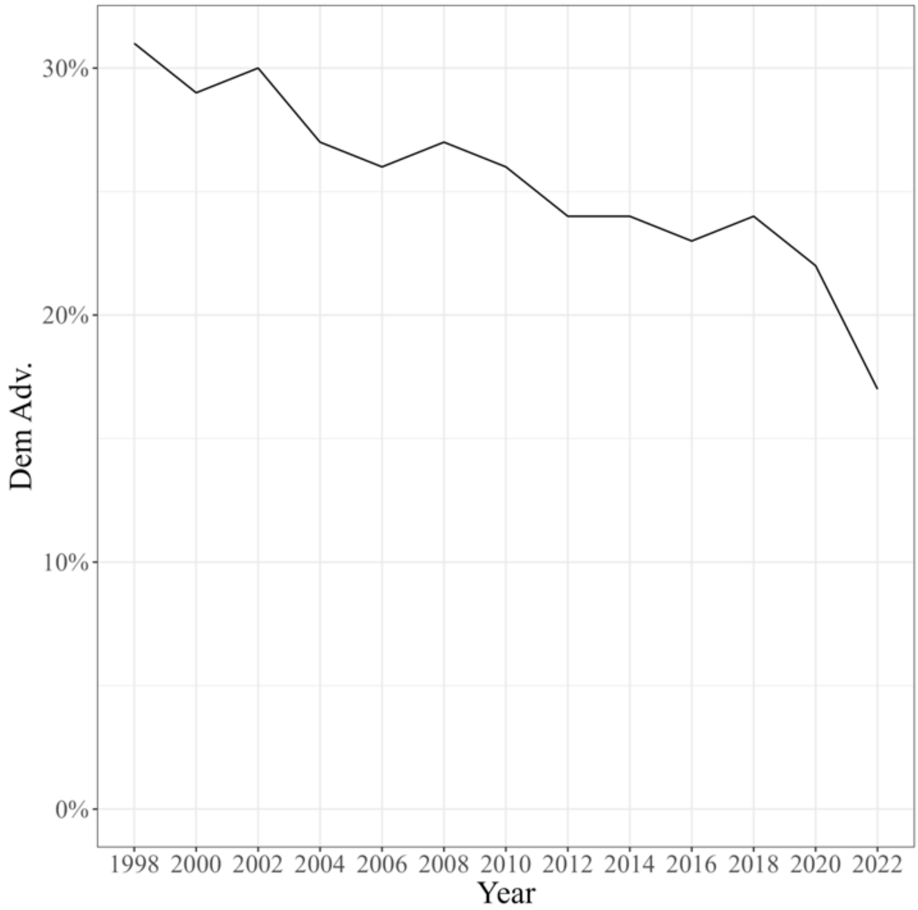


Figure 18: Dem. Registration Advantage, New Mexico 3rd Congressional District, 1998-2022



Note how nicely this dovetails with the observation above that one must necessarily rob Peter to pay Paul, and that this limits what a would-be gerrymanderer may accomplish. The party registration in the districts is largely equalized, but pushing it further in any direction would make one district or another more competitive. If a map-maker wished to make District 2 even more Democratic, she would have to either make District 3 more Republican or make District 1 more Republican. Given the long-term trend toward Republicans in District 3, this might be dangerous by the end of the decade, while District 1 is already relying on the Democratic trend among suburban Independents and Republicans to vote Democratic.

While party registration is a useful indicator, it is not the *only* indicator. After all, even though Democrats had a registration advantage in District 2 until late 2021, the district elected Republicans to Congress, with two brief interludes. Likewise, District 1 stopped electing Republicans in 2008, in part because suburban Republicans and independents have shown increasing willingness to vote for Democrats.

Looking at actual vote results in these districts reveals that the 2021 redistricting moved the state much closer to the platonic ideal of a gerrymandered map in a small, competitive state described above, whether we use presidential vote share or our index.

Democratic Vote Shares, 2020 and 2022 Lines

District	2020 Lines, Biden %	2022 Lines, Biden %	2020 Lines, D Index %	2022 Lines, D Index %
1	61.7%	57.4%	60.4%	56.1%
2	44.0%	53.0%	46.1%	54.6%
3	59.0%	55.5%	59.9%	57.3%

The 1st and 3rd Districts are made less Democratic, but not so much less Democratic that they might seriously threaten their incumbent Democrats. At the same time, the 2nd District is transformed from one where Republicans would generally be favored into one where Democrats tend to win. It is now Democratic enough where a Republican incumbent in a generally favorable Republican environment could be toppled; one of only two such incumbents to lose in 2022.

As a final illustration of this, we can look at the ten statewide races included in our index individually, and see how many of these ten races the statewide Democratic candidate won under the earlier lines and the 2022 lines:

Democratic Statewide Wins in District, 2020 and 2022 Lines		
District	# D Wins, 20 lines	# D Wins, 22 lines
1	10	10
2	1	10
3	10	10

The Second District changes from one where Democrats won only 1 of the ten statewide races into one where it won ten of ten. At the same time, Democratic performances in the other 10 races are not appreciably weakened; Democrats won all 10 statewide races under both the previous and current lines.

The upshot of this was that the only Republican in the state's congressional delegation, Congresswoman Yvette Herrell, was defeated. She was one of only two Republican incumbents who lost in what was, generally speaking, a favorable environment for the Republicans. This gave Democrats complete control of the state's delegation for only the third time since it began electing members of Congress through congressional districts, and was just the first time this happened in a year that was not an exceptionally good environment for Democrats (the other two elections where this occurred were 2008 and 2018). And it occurred even as Republicans were winning 44.9% of the statewide vote for Congress. *See* "New Mexico Election Results," *New York Times*, *available at* `https://www.nytimes.com/interactive/2022/11/08/us/elections/results-new-mexico.html?action=click&pgtype=Article&state=default&module=election-results&context=election_recirc&region=StateNavMenu`

6.4 Simulations

6.4.1 Baseline Simulations

To conduct the simulations, I gathered and joined publicly available data with political and demographic data at the census block and precinct levels. After unifying the data at the precinct level, I instructed the simulation to create 1,000,000 sets of three reasonably compact districts, which respect county subdivisions. I was then able to compare the partisanship of the enacted districts to the ensemble of maps.

We can think of this approach as answering the questions, "What would happen if we selected 1,000,000 individuals, gave them basic instructions to keep districts modestly compact and to keep populations equal, withheld political information from them, and then sent them out to draw maps? What sorts of maps would they produce?"

Once the simulation creates our 1,000,000 maps, it calculates the partisan lean of the districts. We can then compare the simulated districts to the enacted map to ensure that they perform comparably well on traditional redistricting criteria. That is to say, we ensure that the Legislature would not have to sacrifice traditional redistricting criteria in order to achieve more balanced maps.

To best illustrate the degree to which the 2022 Map reflects outliers when compared to maps drawn without partisan information, I employed the "gerrymandering index," proposed by Bangia *et al.* (2017) and endorsed by McCartan and Imai in their paper setting forth the algorithm used to generate the districts in this report. *See* Cory McCartan & Kosuke Imai, *Sequential Monte Carlo for Sampling Balanced and Compact Redistricting Plans*, *Annals of Applied Stat* (forthcoming) (manuscript at 24-25), *available at* `https://arxiv.org/pdf/2008.06131.pdf`.

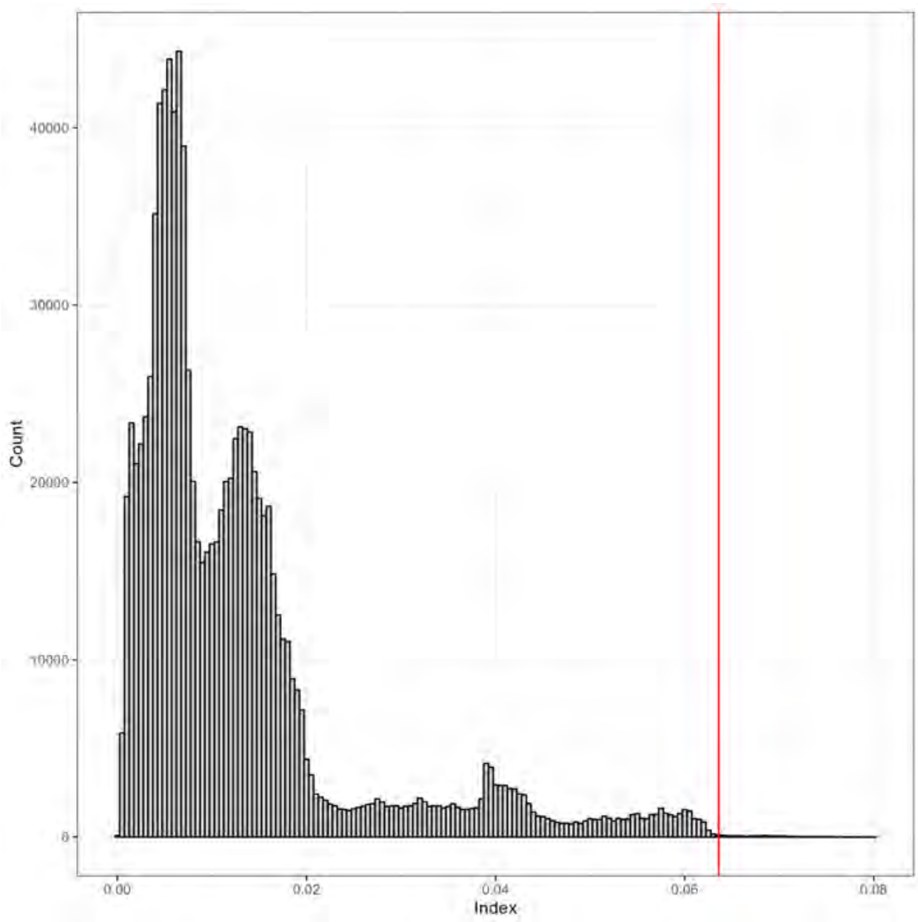
It is conceptually similar to the idea of root mean squared error (used throughout statistics). To calculate the index, we take each of the 1,000,000 simulated maps and rank the districts from most heavily Democratic to least heavily Democratic. We then average Democratic vote shares across ranks. This tells us, generally speaking, what percentage Democratic vote share we would expect the most heavily Democratic district to have in a map drawn without respect to politics, what we would expect the second-most heavily District to have, and so forth.

Of course, some areas might be conducive to a wide range of partisan outcomes depending how the map is drawn. To help account for this, we then calculate the deviations in each plan in the ensemble from the mean for each "bin." To make this less abstract: say that the most heavily Democratic district in the ensemble, on average, gives the Democrats 93.9% of the vote. A district in the ensemble whose most heavily Democratic district was 92% Democratic would have a deviation of 1.9% for that rank, while one whose most heavily Democratic district was 97% Democratic would have a deviation of 3.1%. Next, say that the second most heavily Democratic district in maps in the ensemble is, on average, 92.2% Democratic. A map whose second most heavily Democratic district has a Democratic vote share of 87% would have a deviation of 5.2%, and so forth. To emphasize large deviations (and to make them all positively signed) these values are then squared and added together to give us a sense of how far maps drawn without respect to political data will tend to naturally vary from expectations.

In simplified terms, this gives us the total deviation from the ensemble for all the districts in the plan, while giving more weight to particularly large misses; dividing by three gives us the average deviation. The square root is then taken, which effectively puts everything back on a percentage scale. We then engage in the same exercise for the 2022 Map and compare those scores to those in the ensemble.

The utility of this exercise is that it looks at maps as a whole, rather than in isolation. The results are displayed below:

Figure 19: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Using 2020 POTUS as the Metric for Partisanship



The ensemble maps have, on average, a Gerrymandering Index of around 1.3%. The 2022 Map, on the other hand, is far on the tail of the distribution. It has a Gerrymandering Index of 6.4%, over four standard deviations from the mean. Of the maps in the ensemble, only 1,103 maps, or 0.11%, had larger gerrymandering indices. The probability that the 2022 Map would be drawn by map drawers who were avoiding political information is vanishingly small. In fact, there is a roughly a one-in-1,000 chance that this map would be produced by someone drawing under the same parameters as the computer. To put this in context, the typical standard in the political science discipline for rejecting the possibility that an outcome was merely a result of chance is 1-in-20, or 5%.

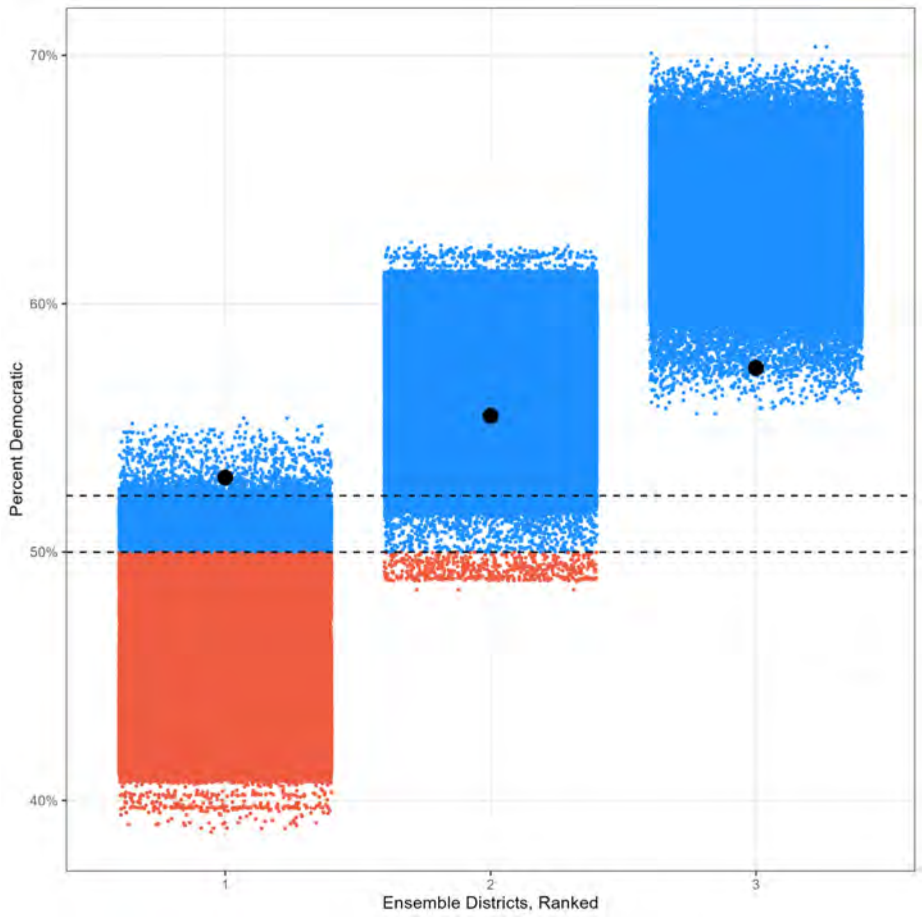
Put simply, it is implausible, if not impossible, that this map was drawn without a heavy reliance upon political data and was likely drawn to favor or disfavor a political party.

Interrogating the maps from a different angle makes clear that the party that the Legislature intended to favor was the Democratic Party, and the one that it intended to disfavor was the Republican Party. To see this, consider the following dotplot. In this plot, all the districts in each of the 1,000,000 simulated maps were sorted from most Democratic to least Democratic. Each of these districts then received a dot in the plot. At the far right, above the number 3, you will notice a large cluster of blue dots spread between 56% and 69%. That means in every plan, the most heavily Democratic district fell somewhere between 56% and 69% Democratic.

The next cluster to the left, hovering above the number 25, consists of blue dots ranging between 49% and 61%. This means that in all of the 50,000 simulated maps, the second-most Democratic district typically fell between 49% and 61% Democratic.

I have also added a dashed horizontal line at 52.27% Democratic. This represents Biden's two-party vote share from 2020. In other words, this marks the point where a PVI flips from favoring Republicans to favoring Democrats.

Figure 20: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using 2020 POTUS as the Metric for Partisanship. Black Dot = 2022 Map

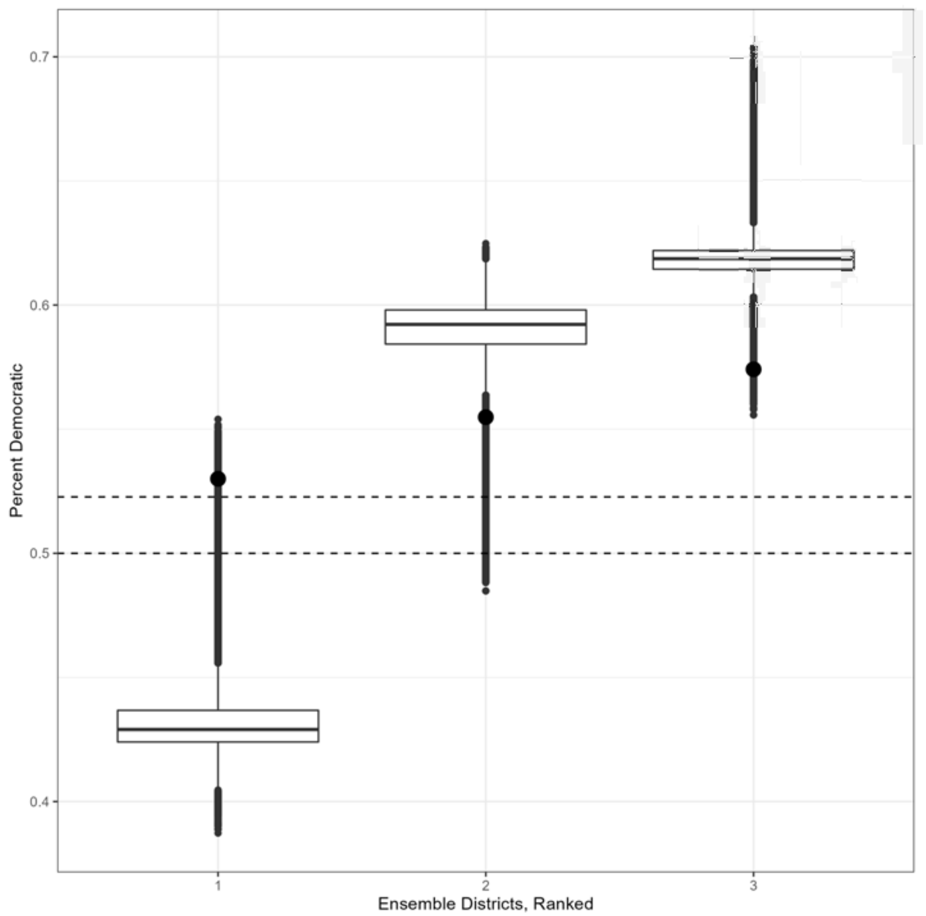


Here, we can see that the most Republican district is at the extreme of the dotplot. Only a handful of the randomly generated maps returned three districts at least as Democratic as the 2022 Map. We can also see how this was brought about: The most heavily Democratic district is made much more Republican than we would expect, but not so Republican that the incumbent would be seriously endangered.

One shortcoming of these dotplots with a large number of districts is that much of the detail is lost. In short, you cannot plot 3 million dots on a 8.5" x 11" page without a significant amount of overplotting. To address this, in the past I have utilized boxplots (as have other scholars, including McCartan and Imai). While these are less intuitive than the dotplots, they don't suffer from the "overplotting" issue.

The way to read a boxplot is as follows: The black horizontal lines represent the median of the distributions. The boxes enclose the middle half of the map values (this statistic is known as the "interquartile range" or "IQR"). The vertical lines coming off of the boxes, known as "whiskers" represent values that are within 1.5 times the values of the "box" in either direction. So, for example, here the boxes for the most Republican district range from 44.6% Democratic to 45.9% Democratic, a range of 1.37 percentage points. The top whisker then ranges from 45.9% to 48%, while the bottom whisker ranges from 44.6% Democratic to 42.5% Democratic. Beyond that, the black dots reflect outliers.

Figure 21: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using 2020 POTUS as the Metric for Partisanship. Black Dot = 2022 Map



As we can see, all of the districts in the Enacted Map would be classified as outliers. Moreover, they are outliers in a very particular manner. The districts that we would expect to be heavily Democratic are still Democratic, but much less so than we'd expect. On the other hand, the district we would expect to be a Republican district is made much more Republican than we would expect. Indeed, its base partisanship is flipped. This pattern reflects the cracking of Democrats in heavily Democratic districts, and their packing into areas where we would expect to see Republican districts, thereby diluting the Republican vote. We see this pattern repeatedly in states where courts have struck down maps; it is the very DNA of a gerrymander. *See also* Gregory Herschlag, *et al.*, *Quantifying Gerrymandering in North Carolina*, 7 *Stat. & Pub. Pol.* 30, 33, 34 (2020) (referring to this pattern as the "signature of gerrymandering").

If we conduct our analysis using the political index described above to measure district partisanship, the results are substantively the same.

Figure 22: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Using Political Index as the Metric for Partisanship

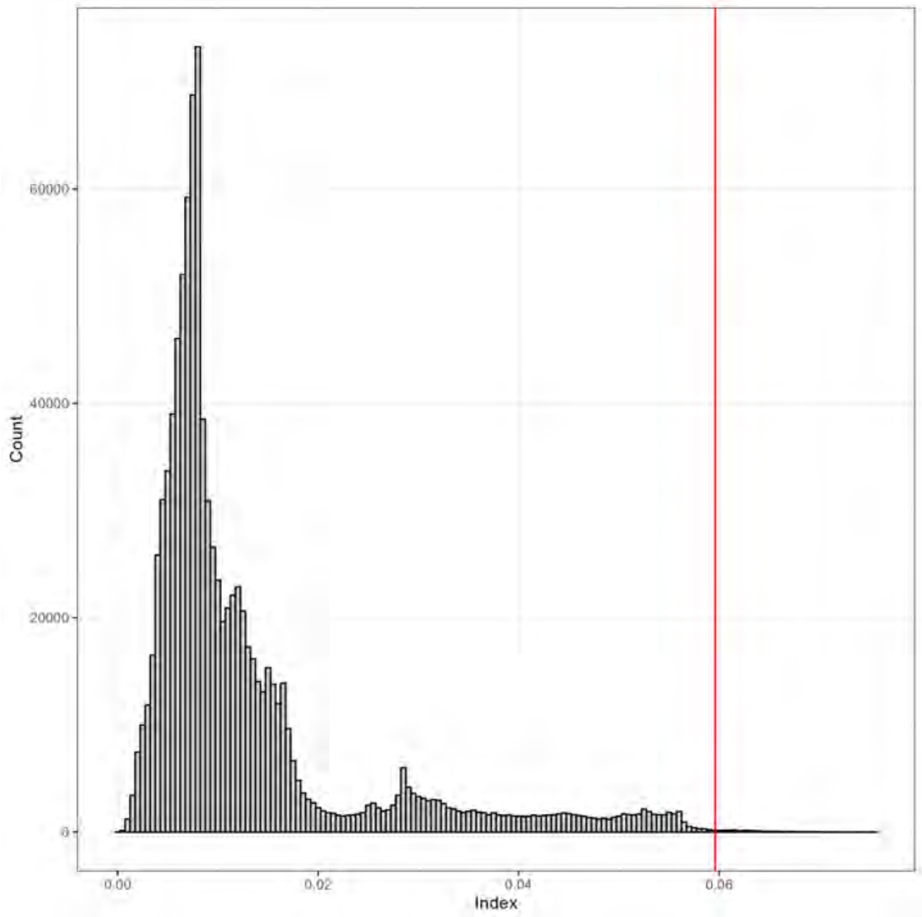


Figure 23: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Political Index as the Metric for Partisanship. Black Dot = 2022 Map

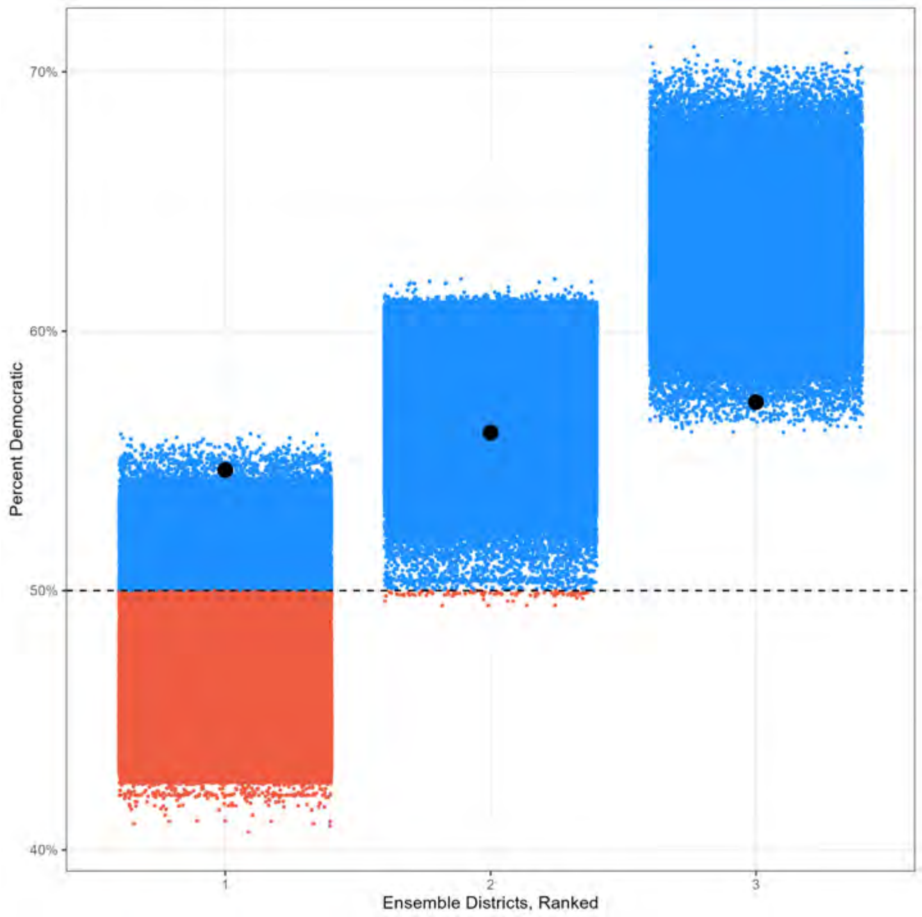
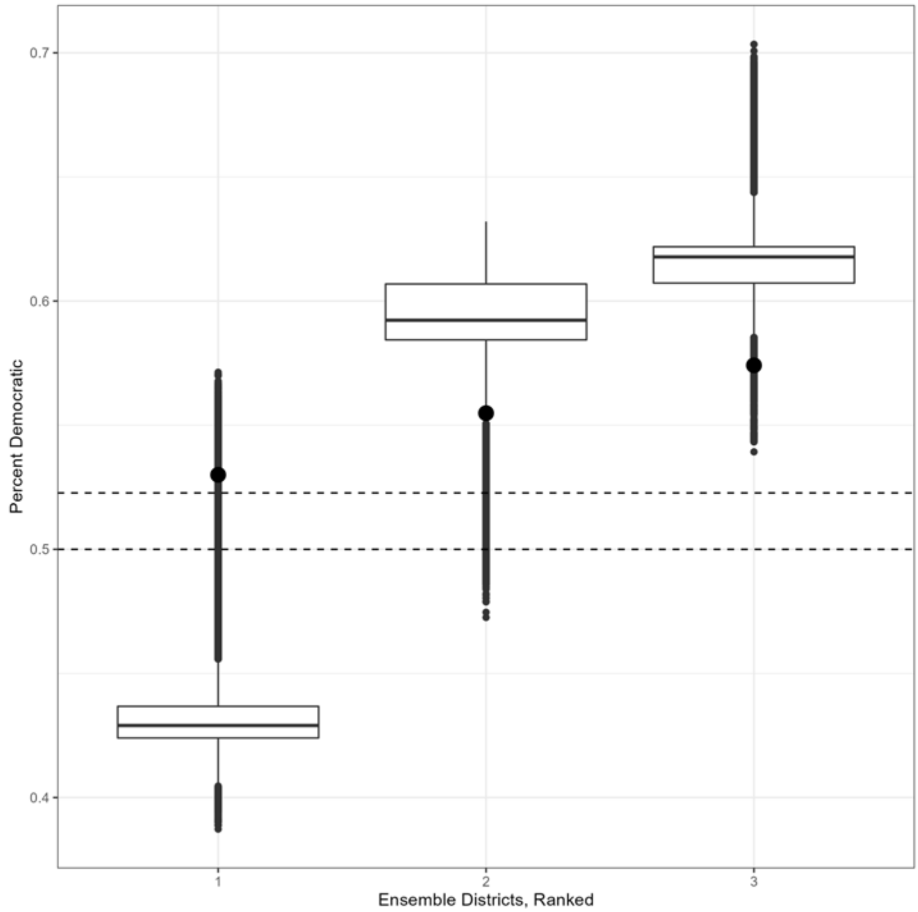


Figure 24: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Political Index as the Metric for Partisanship. Black Dot = 2022 Map



But these simulations assume that the entire map is redrawn. We know from the above, however, that the mapmakers didn't completely redraw the map. Instead, they drew from just two areas of the map. See also NMSA 1978, § 1-3A-7(A)(10) (empowering the citizen's redistricting committee to "to the extent feasible . . . preserve the core of existing districts.").

In situations like this, political scientists will often "freeze" precincts together. This is described in more detail in McCartan and Imai's 'vignette' explaining more complex redistricting environments. See https://alarm-redist.org/redist/articles/map-preproc.html. The most frequent reason for doing this is where the Voting Rights Act is involved. So, for example, in Maryland, I froze the two districts where African-Americans comprised more than 50% of the voting age population (this also necessitated the freezing of a third district, due to geographic constraints). To be sure, there are multiple ways to draw VRA-compliant districts in Maryland, but because VRA analyses are so sensitive and fact-specific, I simply conceded, for sake of argument, that the legislature had drawn those districts in a considerate, fair manner. In New York, I engaged in a similar analysis, freezing the districts where Whites did not comprise a majority of the voting age population and running the simulations on the remaining precincts.

To account for the fact that New Mexico has a history of relatively small changes to its districts and anticipating that the state may offer a desire to at least somewhat continue that trend today, I performed a second set of analyses, which only allowed the precincts the mapmakers swapped between districts to move. That is to say, the precincts from District 1 under the previous lines that were still in District 1 under the new lines were locked together. Likewise, the precincts from District 2 under the previous lines that were still in District 2 under the new lines were locked together, as were the precincts that stayed in District 3.

In effect, this process concedes to the mapmaker that it was proper to keep the precincts in the same district that the mapmaker opted to keep in place; in effect 90% of the map is conceded to the mapmaker. We can therefore ask ourselves: Given the precincts that the mapmakers thought could be swapped between districts, how likely is it that they would have ended up with maps containing the partisan breakdown that the 2022 Maps produced?

Even under such extensive concessions the answer is: It would be astonishingly unlikely. *None* of the 1,000,000 additional maps in this ensemble has the gerrymandering index of the 2022 maps. The average index score is 0.62% for the ensembles. For the Enacted Plan? It is 2.95%, or over seven standard deviations from the mean. It is not on the tails, it is beyond them. It is virtually impossible to arrange the precincts that the mapmakers swapped between districts and come up with anything resembling what the legislature came up with, at least without heavy reliance on partisan data.

Figure 25: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Using 2020 Presidential Election as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting.

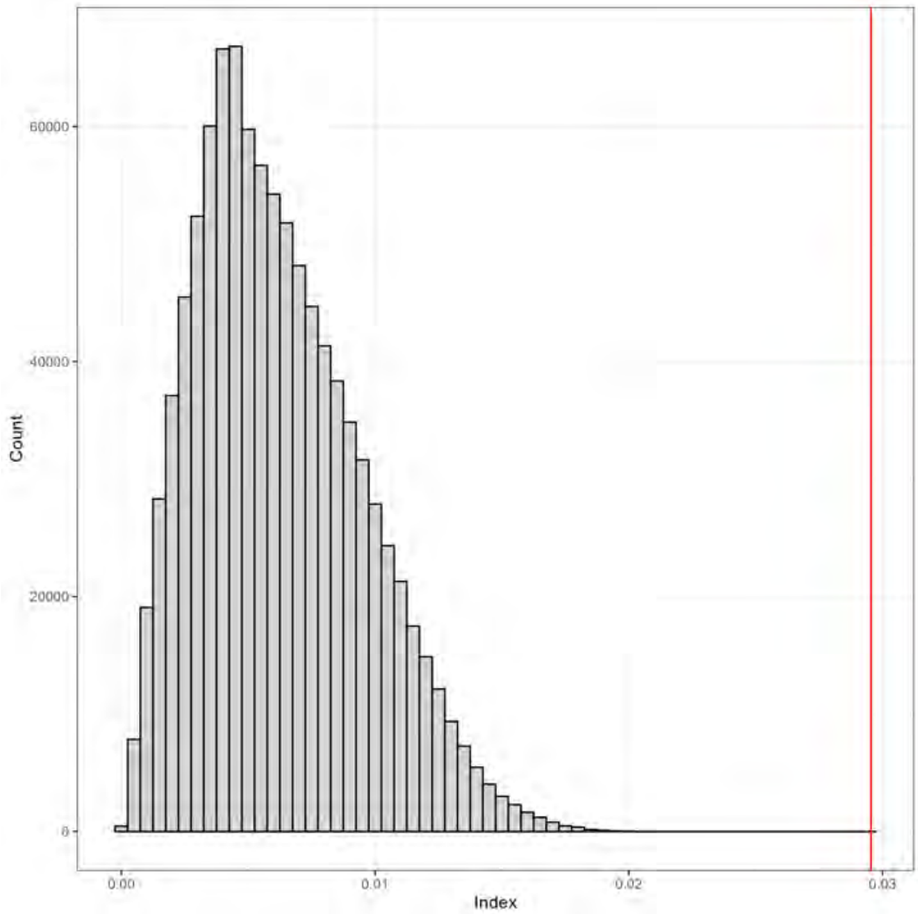


Figure 26: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using 2020 Presidential Election as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting. Black Dot = 2022 Map

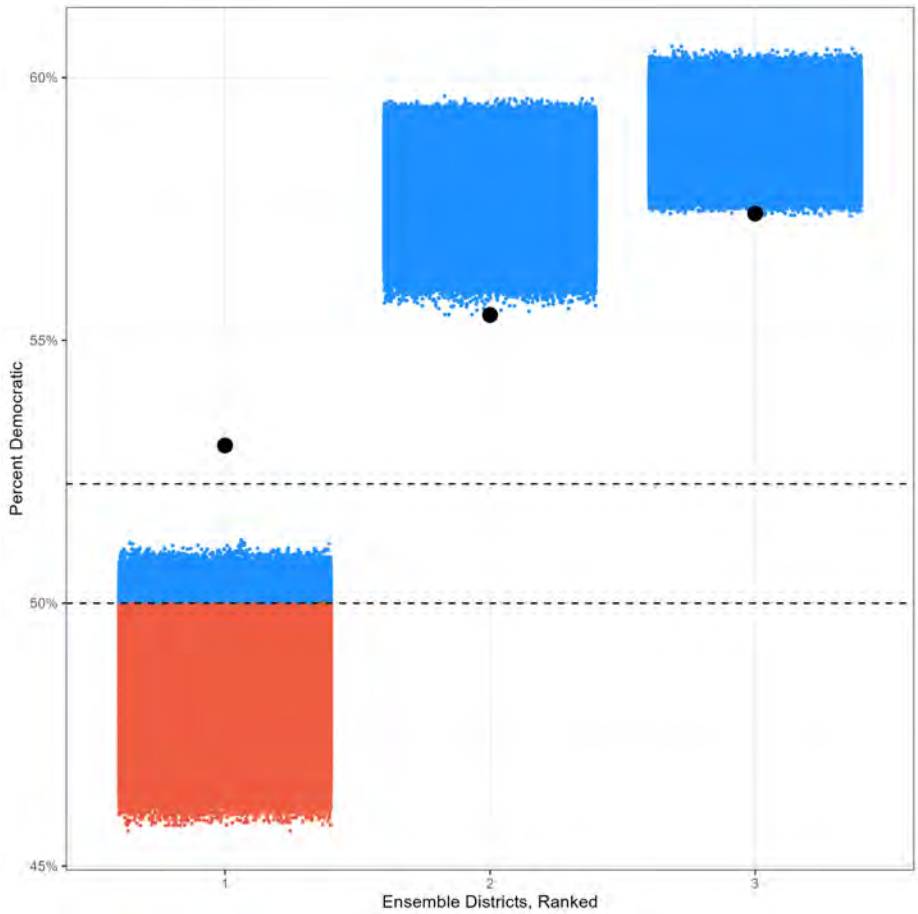
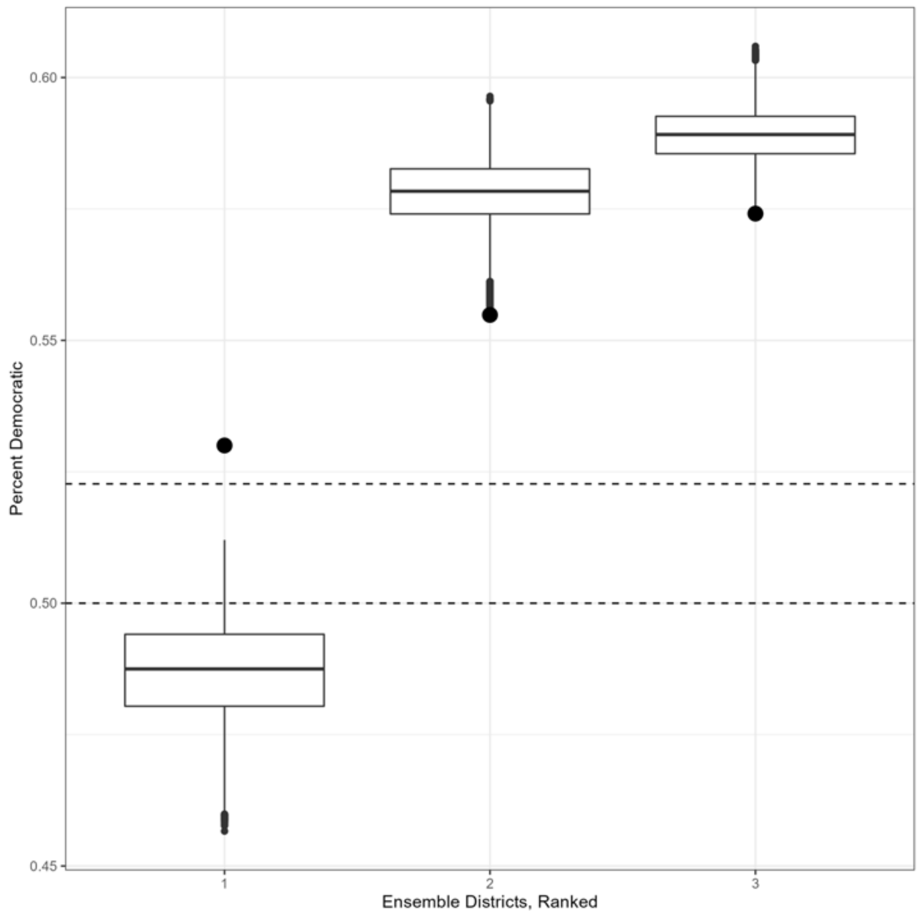


Figure 27: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using 2020 Presidential Election as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting. Black Dot = 2022 Map



None of the simulated maps rearrange the precincts that the mapmakers rearranged and came up with a map where three districts leaned Democratic. Yet that is exactly what the mapmakers produced here. Again, it is virtually impossible to rearrange these precincts without heavily reliance on partisan data and produce the partisan configuration that the mapmakers produced.

Looking at the index produces the same results:

Figure 28: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Using Political Index as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting.

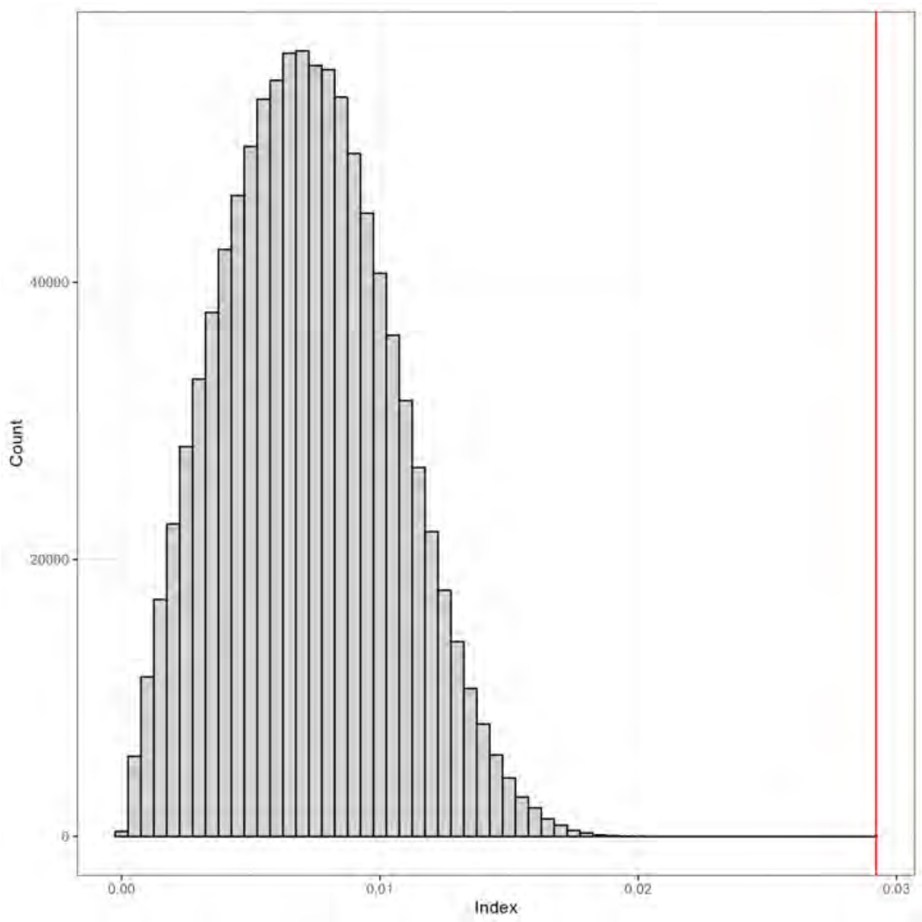


Figure 29: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Political Index as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting. Black Dot = 2022 Map

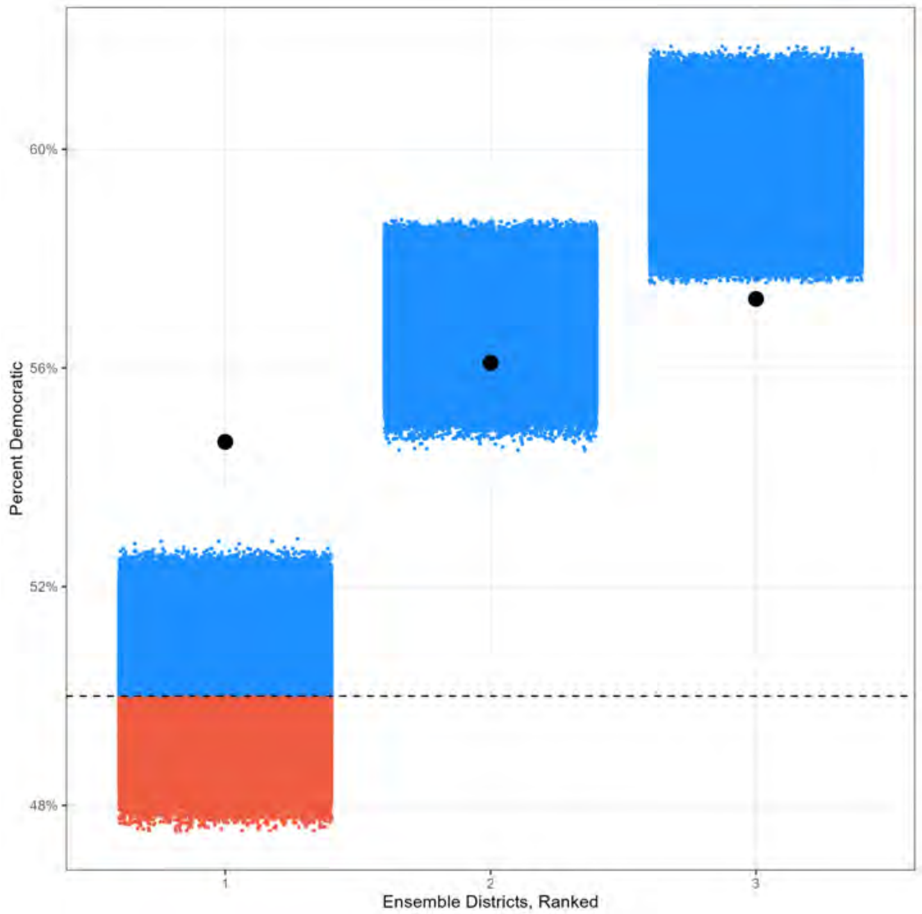
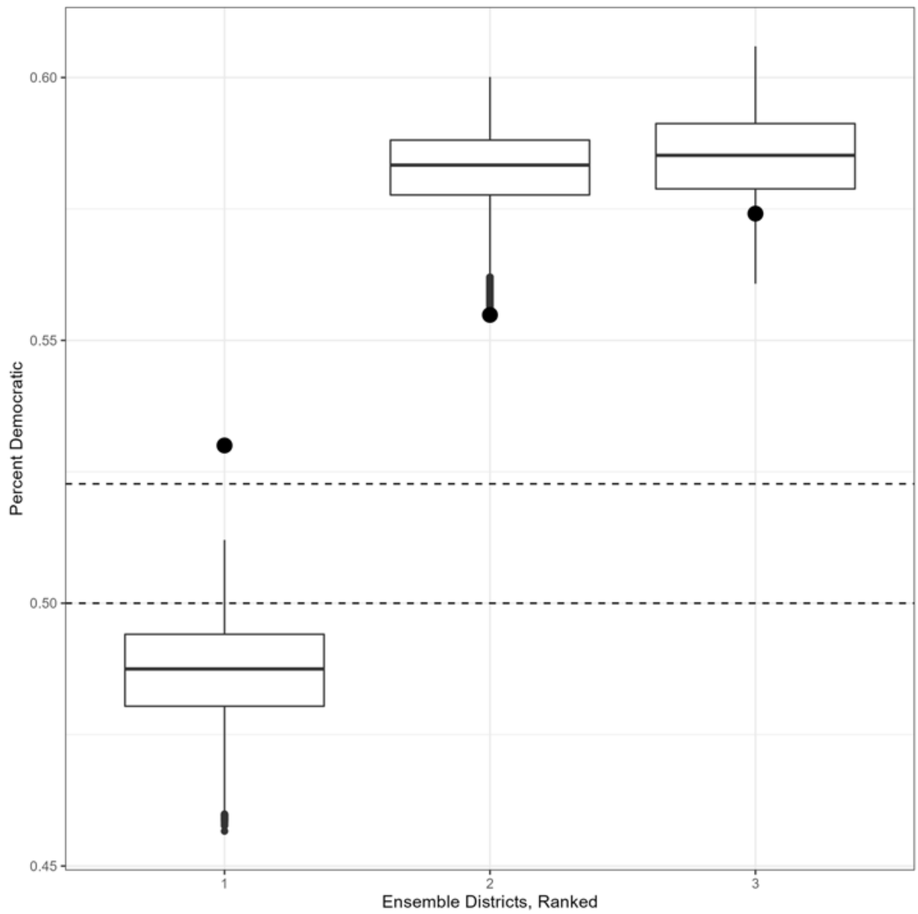


Figure 30: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Political Index as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting. Black Dot = 2022 Map



None of this should be surprising, given what the qualitative analysis revealed. In simple terms, the core of District 1 that was retained gave Joe Biden 61.1% of the vote; the core of District 2 that was retained gave Joe Biden 49.6% of the vote, and the core of District 3 that was retained gave the winner of the 2020 election 61.3% of the vote. The precincts that were moved gave Biden 46.6% of the two-party vote on average. To allocate those precincts in such as to raise Biden's vote share in a district takes work. That is precisely what the mapmakers plainly did here.

6.4.2 Additional Simulations

While the above should be sufficient to demonstrate conclusively that the Enacted Plan is an extreme partisan gerrymander, we may look at other scenarios. Since this is intended as a secondary analysis, I have limited the simulations run to 10,000 in each scenario, which is more than enough in an SMC simulation to pull a representative sample of maps.

The first set of simulations mimics the first inquiry above, except instead of using vote outcomes, it uses registration. This is a secondary analysis because (1) as explained above, registration does not necessarily correspond to voting in New Mexico (a registered Democrat in southwest New Mexico can be very different than a registered Democrat in Santa Fe; the same is true for Republicans); (2) the political science literature with which I am familiar has almost entirely utilized vote outcomes; the simulations provided in *Rucho* focused on election outcomes, not registration. Third, the available data don't match neatly with the shapefiles. The November 2020 data do match up mostly with the VEST precinct shapefile, but it does require merging a precinct in Taos County. This analysis is included only for the sake of completeness.

Regardless, using the Democratic share of two-party registration statistics brings about marginally better results for the state. But the map is still an extreme gerrymander. Just 1.92% of the ensemble's maps have larger gerrymandering indices, and the map is over 3 standard deviations from the mean (3.4 sd's).

Figure 31: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Using Registration as the Metric for Partisanship.

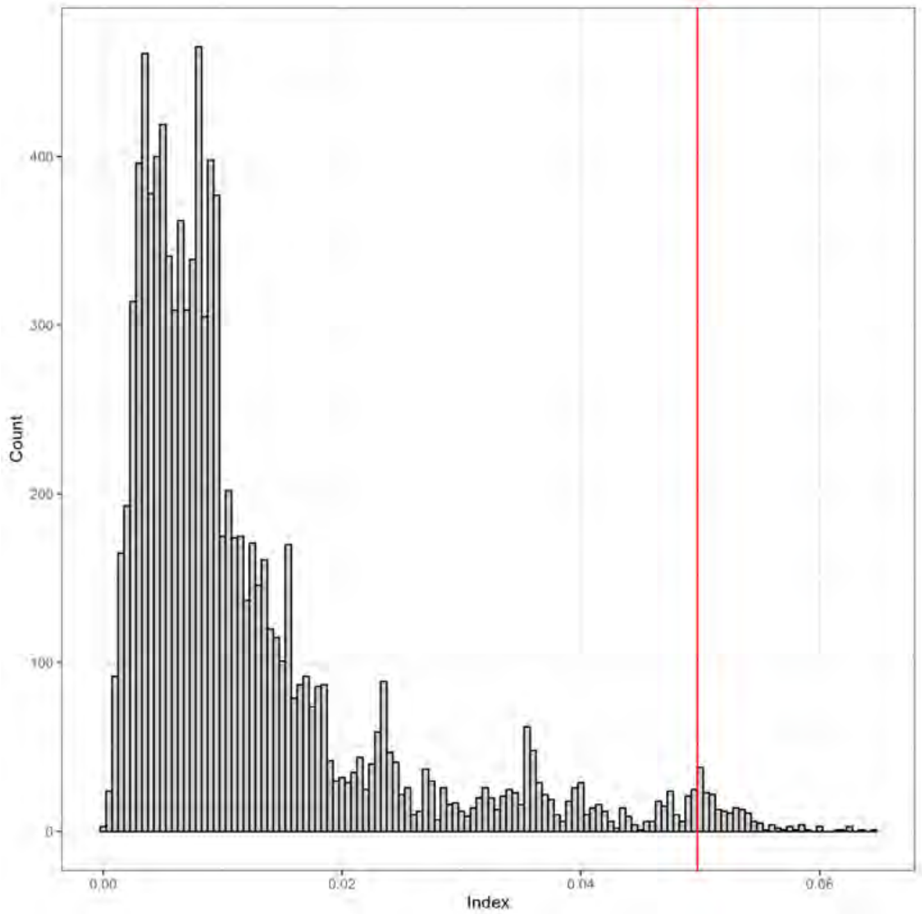


Figure 32: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps. Black Dot = 2022 Map

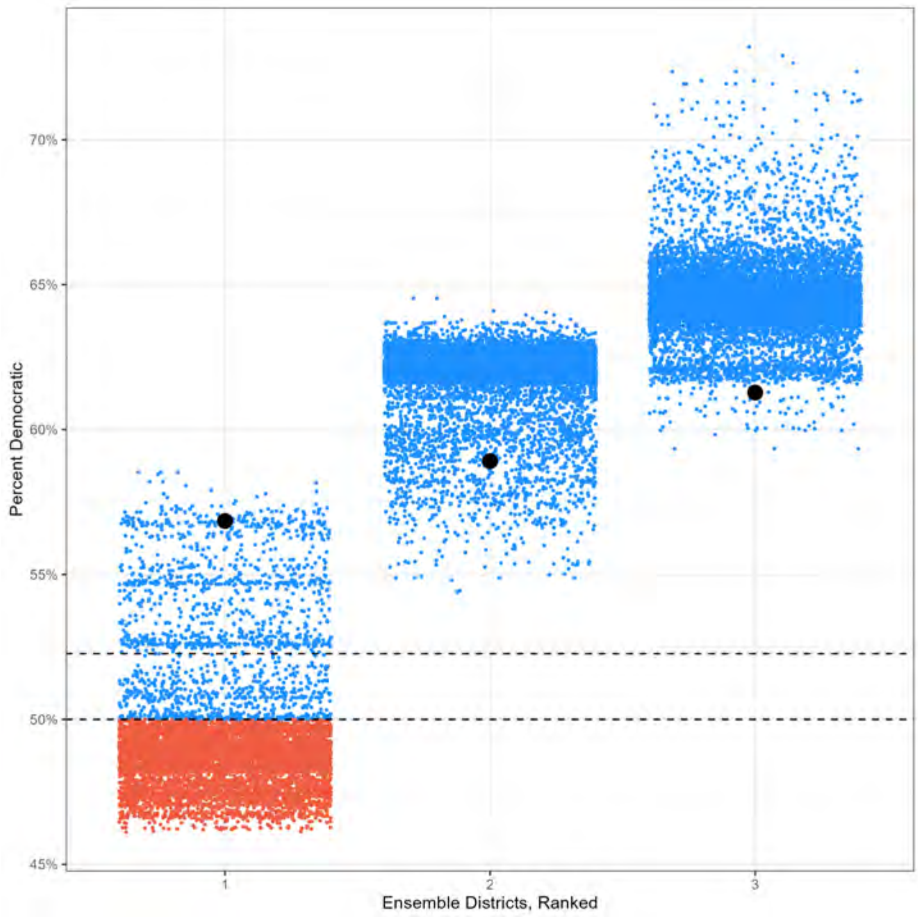
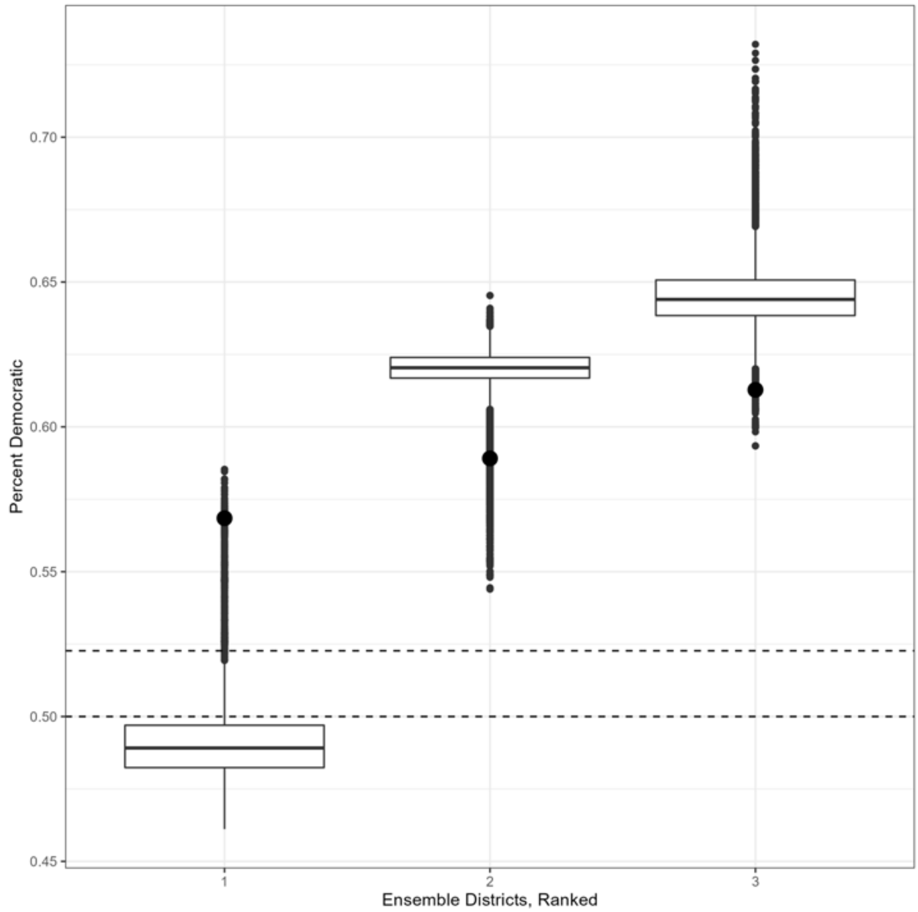


Figure 33: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps. Black Dot = 2022 Map



Likewise, running the simulations on the precincts that were swapped reveals similar outcomes, with only 1.2% of maps in the ensemble reporting more extreme registration advantages for Democrats, and an outcome over two standard deviations from the mean:

Figure 34: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Using Registration as the Metric for Partisanship, Swapped Precincts Only.

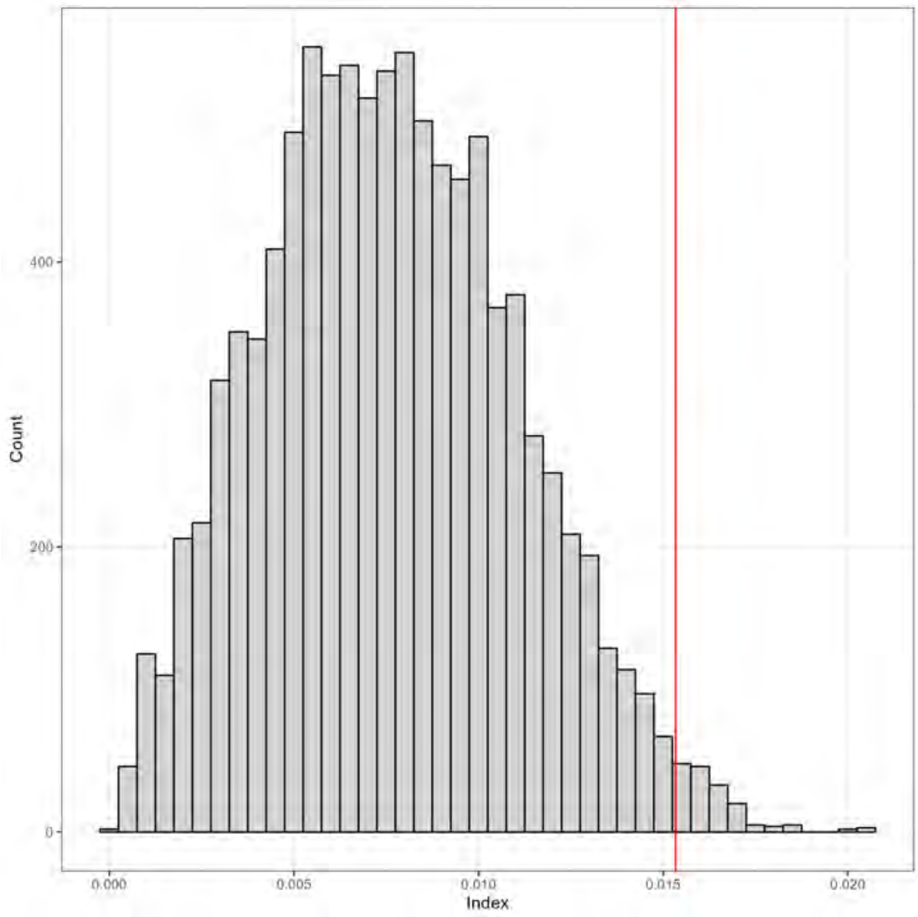


Figure 35: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps, Swapped Precincts Only. Black Dot = 2022 Map

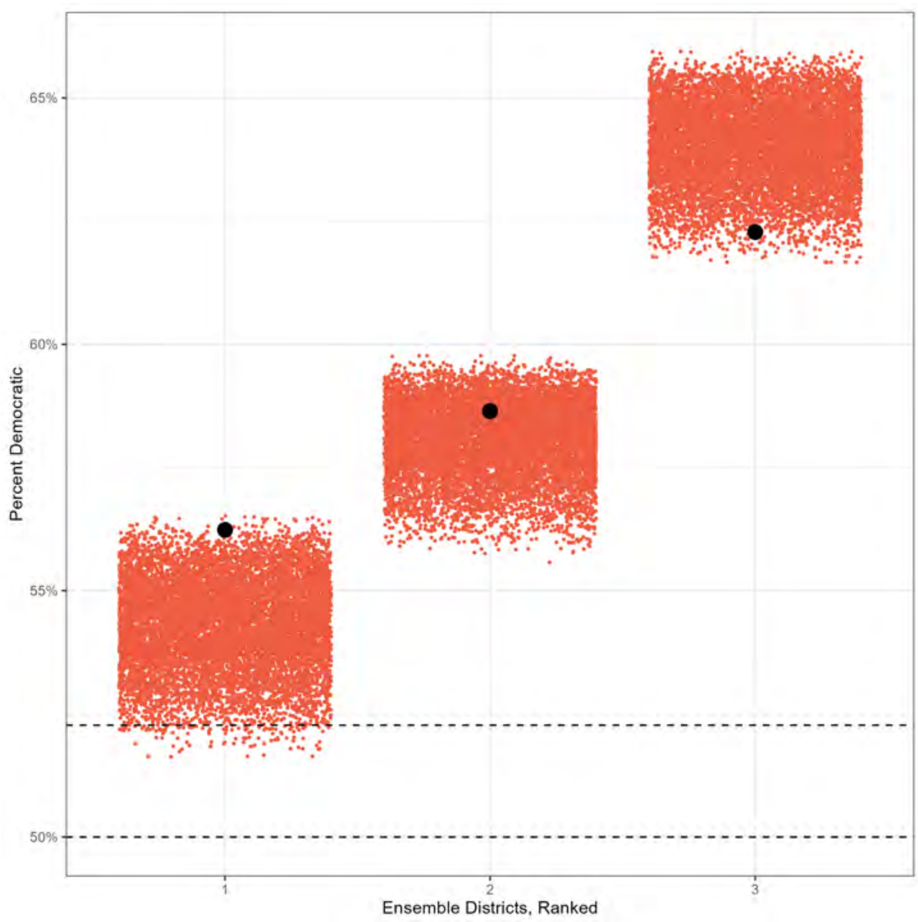
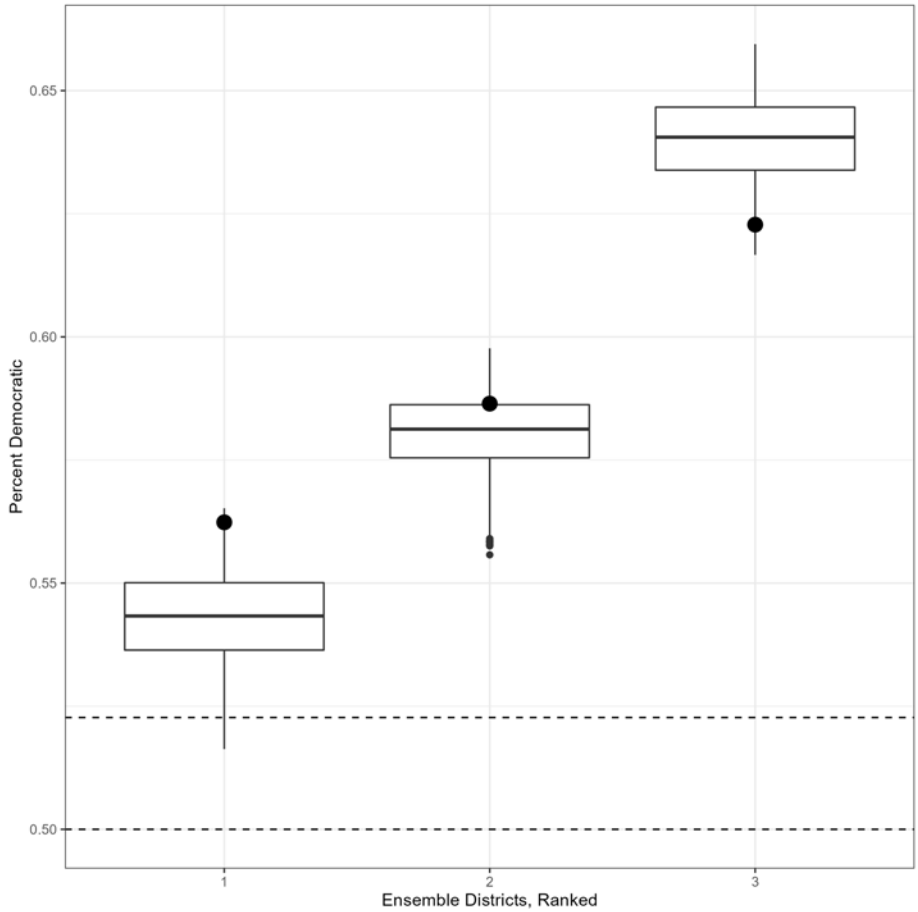


Figure 36: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps, Swapped Precincts Only. Black Dot = 2022 Map



Second, we can compare the plan the legislature enacted to the Citizen Commission's Plan H, which is in many ways similar to the Enacted Plan. First, we should note that our expectation should likely be that this would present unfavorably for Defendants. An examination of the partisanship of the precincts that were retained from Plan H, and the precincts that were swapped from Plan H shows that the mapmakers took a map that was already favorably aligned toward Democrats, and made it even more so:

Partisanship of Precincts Moved From Plan H to Enacted Plans, By District				
Citizens Commission H	Enacted Map	Biden votes	Trump votes	Biden Share
1	1	176,902	122,343	59.1%
1	2	15,415	12,550	55.1%
2	1	756	1,092	40.9%
2	2	121,335	109,951	52.5%
2	3	14,917	28,815	34.1%
3	1	10,796	11,418	48.6%
3	2	6,446	6,259	50.7%
3	3	155,047	109,466	58.6%

In particular, the commission retained precincts from Plan H that created three districts that voted for President Biden with at least 52.5% of the vote, roughly his national vote share. It then transferred a collection of precincts from Plan H's District 1 to District 2 that voted 55.1% for Biden. This was offset in part by moving a collection of precincts from District 2 to District 1 that gave President Trump almost 60% of the vote.

Likewise, the mapmaker shifted a net of over 14,000 Trump votes from District 2 in Plan H to District 3 in the Enacted Map. This group gave Biden just 34.1% of the vote. In exchange, it shifted a group of voters that gave Biden 50.7% of the vote from District 3 into District 2.

Party registration tells the same story:

Registration of Precincts Moved From Plan H to Enacted Plans, By District				
Citizens Commission H	Enacted Map	Registered Democrats	Registered Republicans	Democratic Share
1	1	188,030	134,807	58.2%
1	2	19,997	12,863	60.9%
2	1	1,008	1,048	49.0%
2	2	161,601	113,726	58.7%
2	3	20,167	31,669	38.9%
3	1	11,563	12,425	48.2%
3	2	6,486	6,799	48.8%
3	3	202,606	112,274	64.3%

Thus, it should be completely unsurprising that the resulting map represents an extreme gerrymander, with an ultimate gerrymandering index 6.67 standard deviations from the mean. Again, it is beyond the tails.

Figure 37: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Swapped Precincts from Plan H Only.

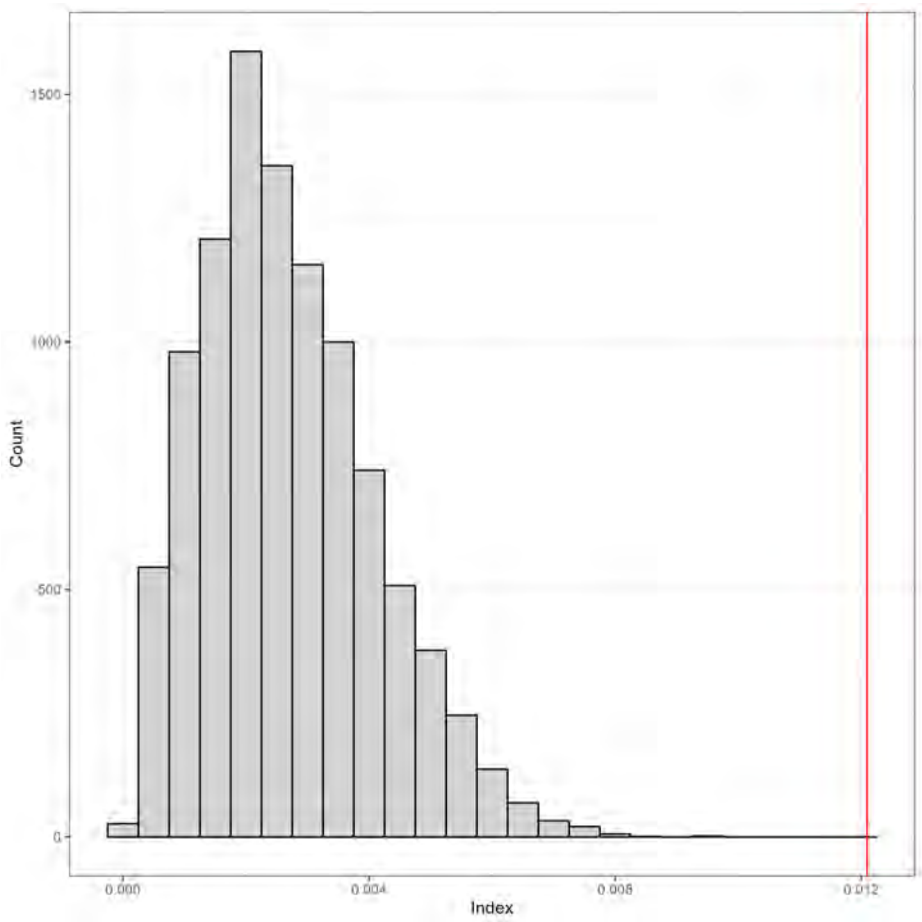


Figure 38: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps, Swapped Precincts from Plan H Only.

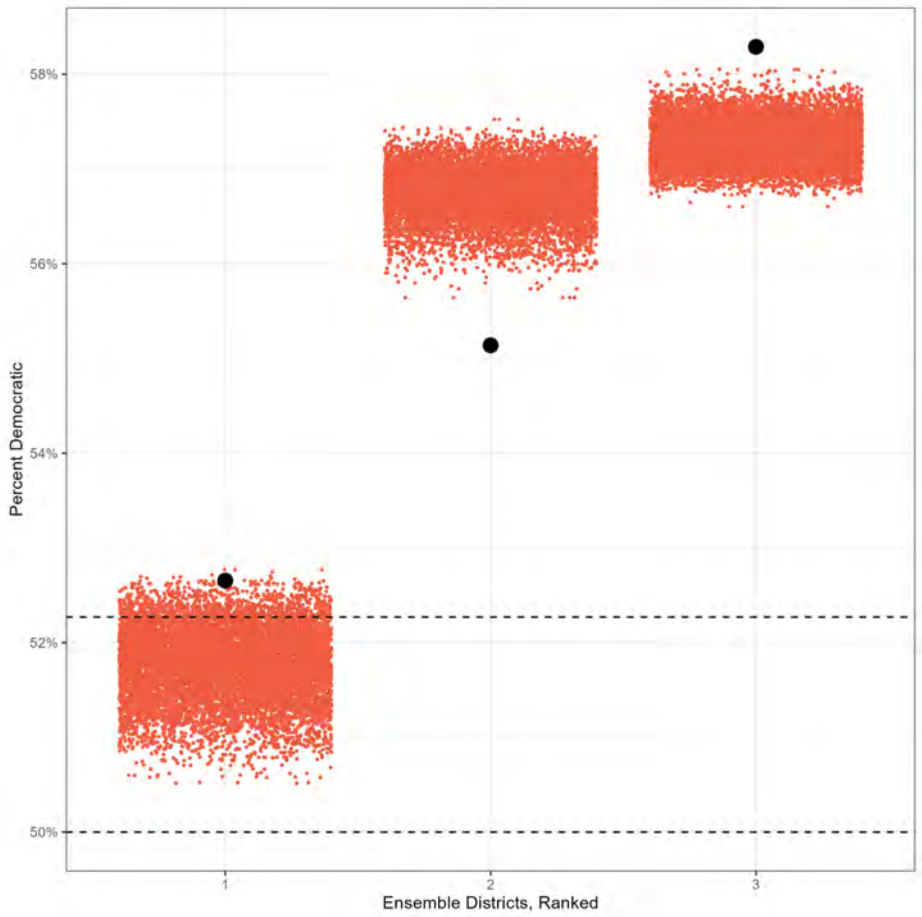
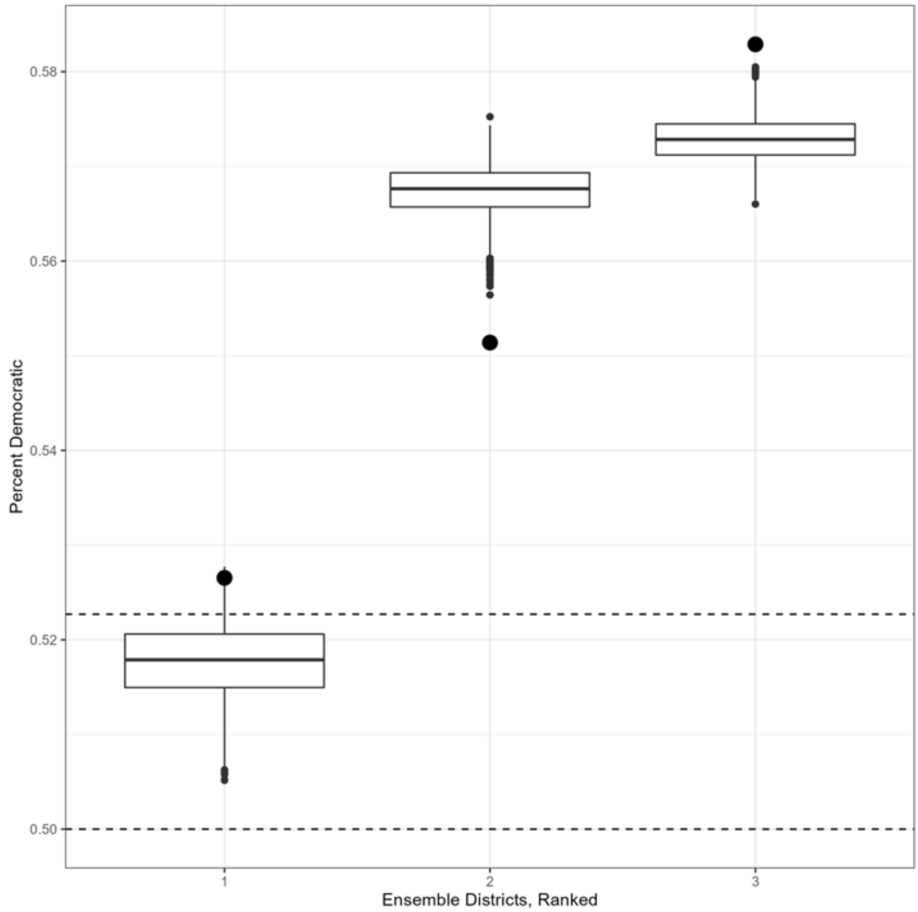


Figure 39: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps, Swapped Precincts from Plan H Only.



A final consideration may be a desire to keep Indian Reservations and other Indigenous homelands intact. To check this, I obtained a shapefile of Reservations from the Redistricting Data Hub. I matched census blocks to the Reservations, and then merged together precincts that overlapped those entities. Thus, every precinct that includes a Reservation is merged together, ensuring that the Reservations are not split.

The answer does not change. Even with these precincts frozen together, the Enacted Plan is an extreme outlier.

Figure 40: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Keeping Reservations Intact

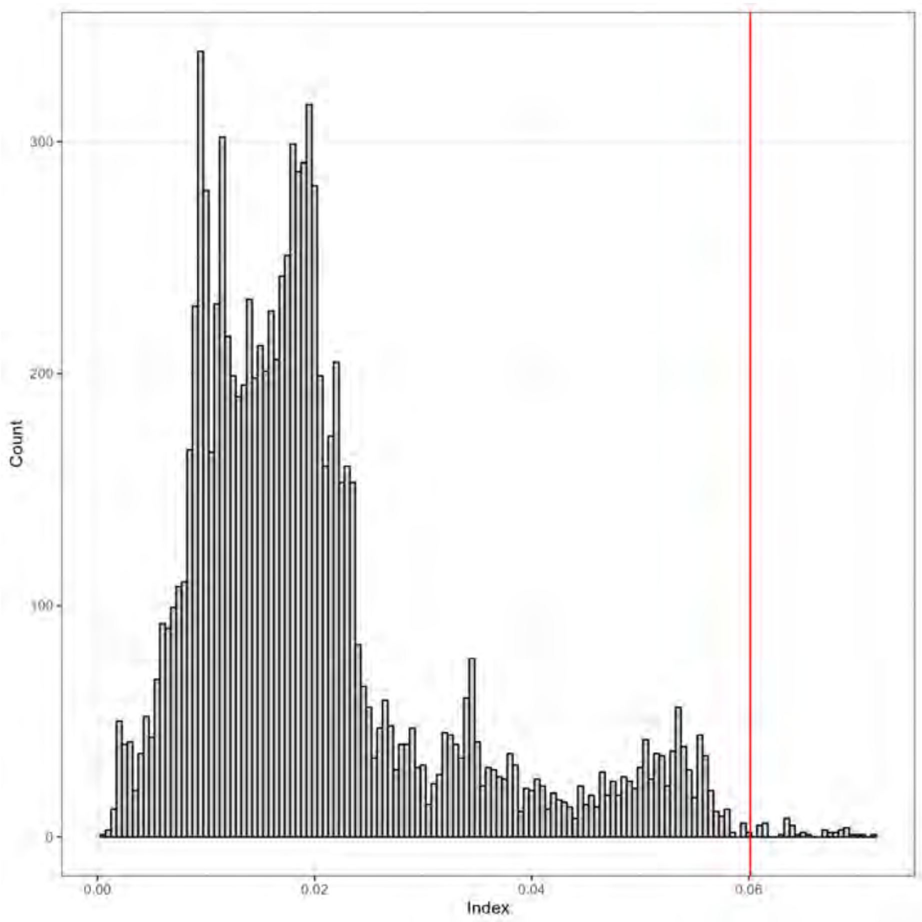


Figure 41: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Presidential Vote Share in 2020 as the Metric for Partisanship. Black Dot = 2022 Map. Reservations are frozen together.

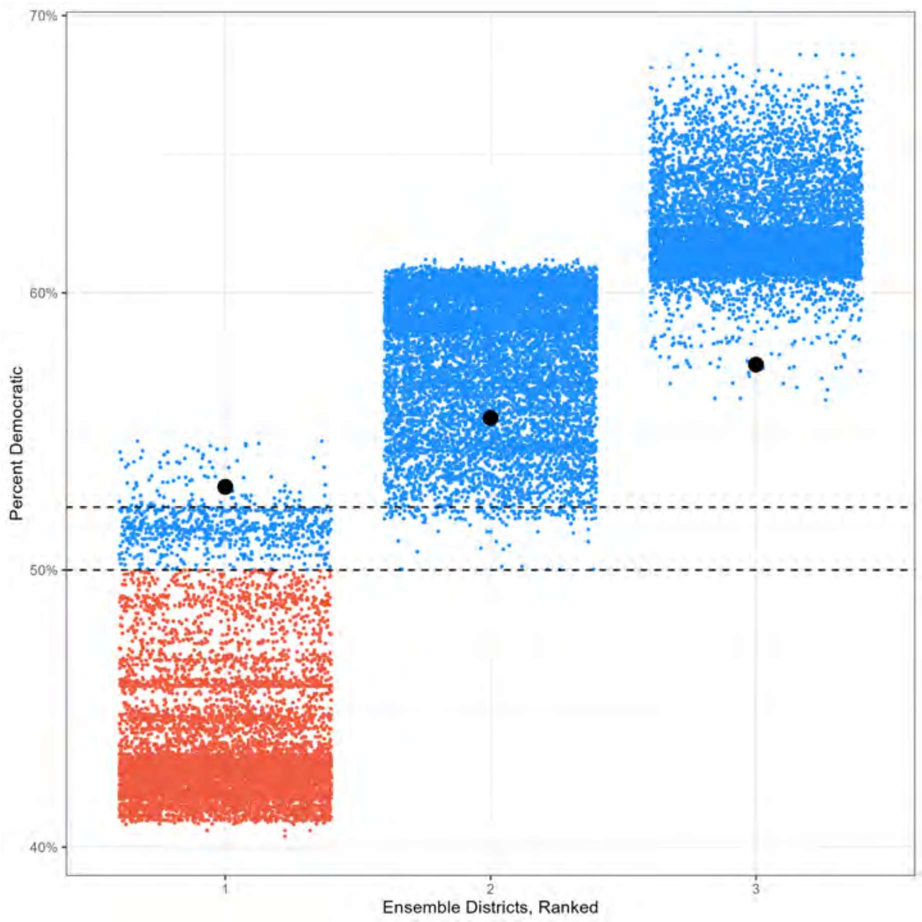
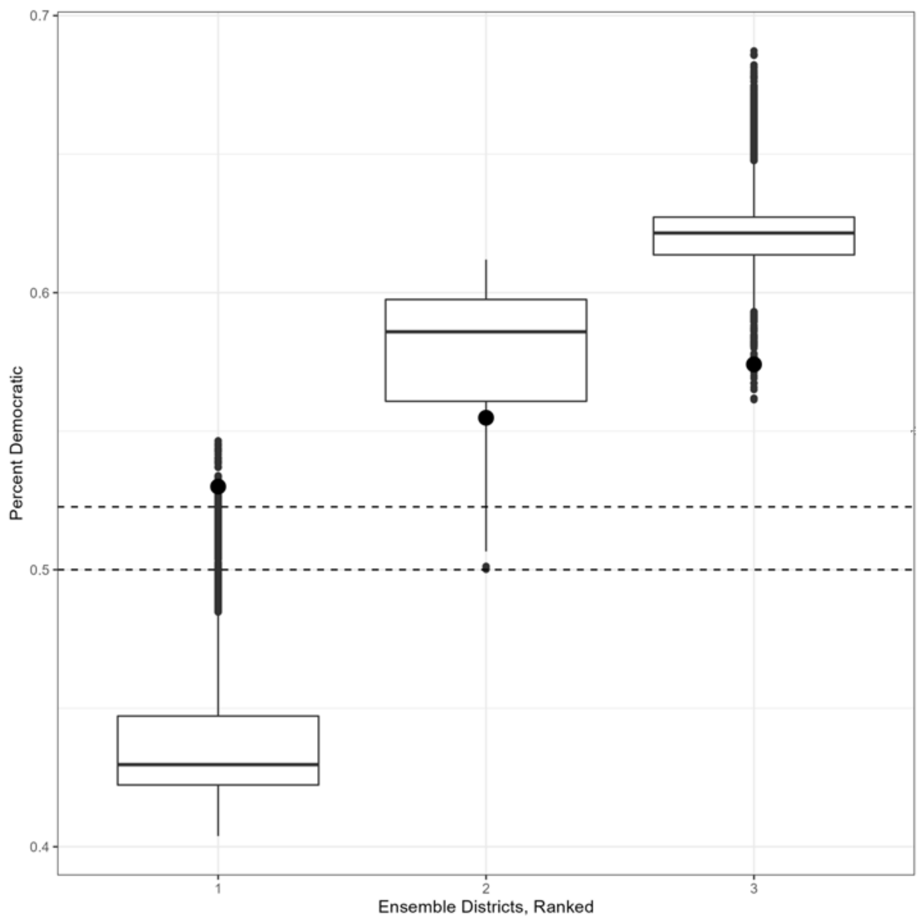


Figure 42: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Presidential Vote Share in 2020 as the Metric for Partisanship. Black Dot = 2022 Map. Reservations are frozen together.



7 Additional Considerations

Finally, there may be other legitimate considerations that motivate a legislature. Many of these are controlled for in the simulations above. However, it is worth comparing the performance of the Enacted Map against previous New Mexico maps. To begin with, we can examine the number of county splits.

Total Splits, New Mexico Congressional Maps	
Year	# Splits
1972	1
1982	3
1992	5
2002	5
2012	6
2022	9

While previous maps haven't had the minimum number of county splits possible, they have never had more than six splits. The Enacted Map, however, splits nine, the most in New Mexico's history.

We can also look to see how the compactness of the Enacted Map's districts compares to previous maps in New Mexico. To do this, I employ three commonly utilized metrics. The first two metrics are based on comparing the drawn district to a circle, which is the most compact shape. The Reock score looks at the ratio of the area of the district to the area of the smallest circle that would enclose the district (also known as a "minimum bounding circle"). Ernest Reock, *A Note: Measuring Compactness as a Requirement of Legislative Apportionment*, 1 *Midwest J. Pol. Sci.* 70, 71 (1961). This ratio will fall as districts become distorted lengthwise; it therefore punishes long, bacon-like districts. A "perfect" Reock score is 1, while a zero is a theoretical perfectly non-compact district.

The second measure is the Polsby-Popper score, which looks at the ratio of the area of a district to the area of a circle that has the same perimeter as the district. Daniel D. Polsby & Robert D. Popper, *The Third Criterion: Compactness as a Procedural Safeguard Against Partisan Gerrymandering*, 9 *Yale L. & Pol'y Rev.* 301 (1991). To understand the motivation behind Polsby-Popper, sketch out a circle. Then erase some of the edge of the circle, and have a narrow tendril snake into the district toward the center. The Reock score would not change much, since the size of the minimum bounding circle remains the same and the area of the district does not change much, but the Polsby-Popper score would fall significantly, since the perimeter of the district would be greatly increased. A "perfect" Polsby-Popper score is 1, while a theoretical perfectly non-compact district would score a zero.

The final measure that I examine is the Convex Hull score. It is similar to the Reock score except that it uses the minimum bounding polygon instead of the minimum bounding circle. To understand this, consider that a perfect square – something that most people would consider a compact district – has a Reock score of 0.64. By allowing for shapes other than a circle to be the benchmark, the Convex Hull score recognizes that compactness can come in many forms. Like the other scores, a 1 is the most compact district and a zero is a theoretical non-compact district.

The following table provides the average scores for New Mexico's maps:

Average Compactness, New Mexico Congressional Maps

Year	Reock	Polsby-Popper	Convex Hull
1972	0.487	0.490	0.838
1982	0.324	0.345	0.746
1992	0.420	0.340	0.765
2002	0.408	0.361	0.784
2012	0.388	0.350	0.785
2022	0.368	0.289	0.730

By any metric, the districts produced in 2021 are some of the least compact districts in New Mexico history. Using Convex Hull and Polsby-Popper, they are the least compact Congressional Districts ever drawn. Using Reock scores, they are the second-least compact Congressional Districts. Under any of the three metrics, the 2021 lines are less compact than the preceding lines.

8 Conclusion

A careful qualitative analysis reveals that the 2021 redistricting shifted large numbers of Democrats from the 1st and 3rd Districts into the 2nd, while shifting large numbers of Republicans out of that district. The resulting map is one of the least compact maps in New Mexico's history, with a record number of split counties. It cracks the most Republican region of the state, splitting it among three districts, while carefully ensuring that the two Democratic districts – the 1st and the 3rd – don't become dangerously Republican.

A simulation analysis confirms these suspicions. Across millions of maps, under multiple assumptions and scenarios, the Enacted Map presents as an extreme outlier. Note that the ensembles still present a wide array of district configurations for a would-be mapmaker to choose from; the legislature's discretion is not entirely cabined in. What it cannot do is select *this* combination of precincts, which would almost certainly only arise in a scenario where political considerations predominate.

In short, no matter how one looks at it, this map is an extreme gerrymander under the test outlined by Justice Kagan and endorsed by the Supreme Court of New Mexico.

I declare under penalty of perjury under the laws of the State of New Mexico that the foregoing is true and correct. See N.M. R. Civ. P. Dist. Ct.1-011(B).

Dated: August 11, 2023

Sean P. Trende

SEAN P. TRENDE

Exhibit 1

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EDUCATION

Ph.D., The Ohio State University, Political Science, expected 2023.

M.A.S. (Master of Applied Statistics), The Ohio State University, 2019.

J.D., Duke University School of Law, *cum laude*, 2001; Duke Law Journal, Research Editor.

M.A., Duke University, *cum laude*, Political Science, 2001. Thesis titled *The Making of an Ideological Court: Application of Non-parametric Scaling Techniques to Explain Supreme Court Voting Patterns from 1900-1941*, June 2001.

B.A., Yale University, with distinction, History and Political Science, 1995.

PROFESSIONAL EXPERIENCE

Law Clerk, Hon. Deanell R. Tacha, U.S. Court of Appeals for the Tenth Circuit, 2001-02.

Associate, Kirkland & Ellis, LLP, Washington, DC, 2002-05.

Associate, Hunton & Williams, LLP, Richmond, Virginia, 2005-09.

Associate, David, Kamp & Frank, P.C., Newport News, Virginia, 2009-10.

Senior Elections Analyst, RealClearPolitics, 2009-present.

Columnist, Center for Politics Crystal Ball, 2014-17.

Visiting Scholar, American Enterprise Institute, 2018-present.

BOOKS AND BOOK CHAPTERS

Larry J. Sabato, ed., *The Red Ripple*, Ch. 15 (2023).

Larry J. Sabato, ed., *A Return to Normalcy?: The 2020 Election that (Almost) Broke America* Ch. 13 (2021).

Larry J. Sabato, ed., *The Blue Wave*, Ch. 14 (2019).

Larry J. Sabato, ed., *Trumped: The 2016 Election that Broke all the Rules* (2017).

Larry J. Sabato, ed., *The Surge:2014's Big GOP Win and What It Means for the Next Presidential Election*, Ch. 12 (2015).

Larry J. Sabato, ed., *Barack Obama and the New America*, Ch. 12 (2013).

Barone, Kraushaar, McCutcheon & Trende, *The Almanac of American Politics* 2014 (2013).

The Lost Majority: Why the Future of Government is up for Grabs – And Who Will Take It (2012).

PREVIOUS EXPERT TESTIMONY AND DEPOSITIONS

Dickson v. Rucho, No. 11-CVS-16896 (N.C. Super. Ct., Wake County) (racial gerrymandering).

Covington v. North Carolina, No. 1:15-CV-00399 (M.D.N.C.) (racial gerrymandering).

NAACP v. McCrory, No. 1:13CV658 (M.D.N.C.) (early voting).

NAACP v. Husted, No. 2:14-cv-404 (S.D. Ohio) (early voting).

Ohio Democratic Party v. Husted, Case 15-cv-01802 (S.D. Ohio) (early voting).

Lee v. Virginia Bd. of Elections, No. 3:15-cv-357 (E.D. Va.) (early voting).

Feldman v. Arizona, No. CV-16-1065-PHX-DLR (D. Ariz.) (absentee voting).

A. Philip Randolph Institute v. Smith, No. 1:18-cv-00357-TSB (S.D. Ohio) (political gerrymandering).

Whitford v. Nichol, No. 15-cv-421-bbc (W.D. Wisc.) (political gerrymandering).

Common Cause v. Rucho, No. 1:16-CV-1026-WO-JEP (M.D.N.C.) (political gerrymandering).

Mecinas v. Hobbs, No. CV-19-05547-PHX-DJH (D. Ariz.) (ballot order effect).

Fair Fight Action v. Raffensperger, No. 1:18-cv-05391-SCJ (N.D. Ga.) (statistical analysis).

Pascua Yaqui Tribe v. Rodriguez, No. 4:20-CV-00432-TUC-JAS (D. Ariz.) (early voting).

Ohio Organizing Collaborative, et al v. Ohio Redistricting Commission, et al, No. 2021-1210 (Ohio) (political gerrymandering).

NCLCV v. Hall, No. 21-CVS-15426 (N.C. Sup. Ct.) (political gerrymandering).

Szeliga v. Lamone, Case No. C-02-CV-21-001816 (Md. Cir. Ct.) (political gerrymandering).

Montana Democratic Party v. Jacobsen, DV-56-2021-451 (Mont. Dist. Ct.) (early voting; ballot collection).

Carter v. Chapman, No. 464 M.D. 2021 (Pa.) (map drawing; amicus).

NAACP v. McMaster, No. 3:21-cv-03302 (D.S.C.) (racial gerrymandering).

Graham v. Adams, No. 22-CI-00047 (Ky. Cir. Ct.) (political gerrymandering).

Harkenrider v. Hochul, No. E2022-0116CV (N.Y. Sup. Ct.) (political gerrymandering).

LULAC v. Abbott, Case No. 3:21-cv-00259 W.D. Tex. (racial/political gerrymandering/VRA).

Moore et al., v. Lee, et al., Tenn. 20th Dist. 2022 (state constitutional compliance).

Agee et al. v. Benson, et al., W.D. Mich. 2023 (racial gerrymandering/VRA).

Faatz, et al. v. Ashcroft, et al., (Cir. Ct. Mo. 2023) (state constitutional compliance).

Coca, et al. v. City of Dodge City, et al., Case No. 6:22-cv-01274-EFM-RES (D. Kan.) (VRA).

Milligan v. Allen, Case No. 2:21-cv-01530-AMM (N.D. Ala.) (VRA).

Nairne v. Ardoin, NO. 22-178-SDD-SDJ (M.D. La.) (VRA).

COURT APPOINTMENTS

Appointed as Voting Rights Act expert by Arizona Independent Redistricting Commission (2020)

Appointed special Master by the Supreme Court of Virginia to redraw maps for the Virginia House of Delegates, the Senate of Virginia, and for Virginia's delegation to the United States Congress for the 2022 election cycle.

Appointed redistricting expert by the Supreme Court of Belize in Smith v. Perrera, No. 55 of 2019 (one-person-one-vote).

INTERNATIONAL PRESENTATIONS AND EXPERIENCE

Panel Discussion, European External Action Service, Brussels, Belgium, Likely Outcomes of 2012 American Elections.

Selected by U.S. Embassies in Sweden, Spain, and Italy to discuss 2016 and 2018 elections to think tanks and universities in area (declined Italy due to teaching responsibilities).

Selected by EEAS to discuss 2018 elections in private session with European Ambassadors.

TEACHING

American Democracy and Mass Media, Ohio Wesleyan University, Spring 2018.

Introduction to American Politics, The Ohio State University, Autumns 2018, 2019, 2020, Spring 2018.

Political Participation and Voting Behavior, Spring 2020-2023.

PUBLICATIONS

James G. Gimpel, Andrew Reeves, & Sean Trende, "Reconsidering Bellwether Locations in U.S. Presidential Elections," Pres. Stud. Q. (2022) (forthcoming, available online at http://doi.org/10.1111/psq.12793).

REAL CLEAR POLITICS COLUMNS

Full archives available at `http://www.realclearpolitics.com/authors/sean_trende/`

CERTIFICATE OF SERVICE

I hereby certify that a true and complete copy of the foregoing will be served on all counsel via the e-filing system and, separately, via direct email.

Dated: August 11, 2023

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