No. 2023AP001399-OA

IN THE SUPREME COURT OF WISCONSIN

REBECCA CLARKE, RUBEN ANTHONY, TERRY DAWSON, DANA GLASSTEIN, ANN GROVES-LLOYD, CARL HUJET, JERRY IVERSON, TIA JOHNSON, ANGIE KIRST, SELIKA LAWTON, FABIAN MALDONADO, ANNEMARIE MCCLELLAN, JAMES MCNETT, BRITTANY MURIELLO, ELA JOOSTEN (PARI) SCHILS, NATHANIEL SLACK, MARY SMITH-JOHNSON, DENISE (DEE) SWEET, AND GABRIELLE YOUNG,

Petitioners,

GOVERNOR TONY EVERS, IN HIS OFFICIAL CAPACITY; NATHAN ATKINSON, STEPHEN JOSEPH WRIGHT, GARY KRENZ, SARAH J. HAMILTON, JEAN-LUC THIFFEAULT, SOMESH JHA, JOANNE KANE, AND LEAH DUDLEY,

Intervenors-Petitioners,

v.

WISCONSIN ELECTIONS COMMISSION; DON MILLIS, ROBERT F. SPINDELL, JR., MARK L. THOMSEN, ANN S. JACOBS, MARGE BOSTELMANN, AND JOSEPH J. CZARNEZKI, IN THEIR OFFICIAL CAPACITIES AS MEMBERS OF THE WISCONSIN ELECTIONS COMMISSION; MEAGAN WOLFE, IN HER OFFICIAL CAPACITY AS THE ADMINISTRATOR OF THE WISCONSIN ELECTIONS COMMISSION; SENATOR ANDRÉ JACQUE, SENATOR TIM CARPENTER, SENATOR ROB HUTTON, SENATOR CHRIS LARSON, SENATOR DEVIN LEMAHIEU, SENATOR STEPHEN L. NASS, SENATOR JOHN JAGLER, SENATOR MARK SPREITZER, SENATOR HOWARD L. MARKLEIN, SENATOR RACHAEL CABRAL-GUEVARA, SENATOR VAN H. WANGGAARD, SENATOR JESSE L. JAMES, SENATOR ROMAINE ROBERT QUINN, SENATOR DIANNE H. HESSELBEIN, SENATOR CORY TOMCZYK, SENATOR JEFF SMITH, AND SENATOR CHRIS KAPENGA, IN THEIR OFFICIAL CAPACITIES AS MEMBERS OF THE WISCONSIN SENATE,

Respondents,

WISCONSIN LEGISLATURE; BILLIE JOHNSON, CHRIS GOEBEL, ED PERKINS, ERIC O'KEEFE, JOE SANFELIPPO, TERRY MOULTON, ROBERT JENSEN, RON ZAHN, RUTH ELMER, AND RUTH STRECK,

Intervenors-Respondents.

APPENDIX VOL. II TO OPENING REMEDIAL BRIEF OF INTERVENOR-RESPONDENT WISCONSIN LEGISLATURE AND RESPONDENTS SENATORS CABRAL-GUEVARA, HUTTON, JACQUE, JAGLER, JAMES, KAPENGA, LEMAHIEU, MARKLEIN, NASS, QUINN, TOMCZYK, AND WANGGAARD

Counsel Listed on Following Page

BELL GIFTOS ST. JOHN LLC
KEVIN M. ST. JOHN, SBN 1054815
5325 Wall Street, Suite 2200
Madison, WI 53718
608.216.7995
kstjohn@bellgiftos.com

CONSOVOY MCCARTHY PLLC
TAYLOR A.R. MEEHAN*
RACHAEL C. TUCKER*
DANIEL M. VITAGLIANO*
C'ZAR D. BERNSTEIN*
1600 Wilson Blvd., Suite 700
Arlington, VA 22209
703.243.9423
taylor@consovoymccarthy.com

LAWFAIR LLC
ADAM K. MORTARA, SBN 1038391
40 Burton Hills Blvd., Suite 200
Nashville, TN 37215
773.750.7154
mortara@lawfairllc.com

AUGUSTYN LAW LLC
JESSIE AUGUSTYN, SBN 1098680
1835 E. Edgewood Dr., Suite 105-478
Appleton, WI 54913
715.255.0817
jessie@augustynlaw.com

LEHOTSKY KELLER COHN LLP
SCOTT A. KELLER*
SHANNON GRAMMEL*
GABRIELA GONZALEZ-ARAIZA*
200 Massachusetts Avenue, NW
Suite 700
Washington, DC 20001
512.693.8350
scott@lkcfirm.com

LEHOTSKY KELLER COHN LLP
MATTHEW H. FREDERICK*
408 West 11th St., Fifth Floor
Austin, TX 78701
matt@lkcfirm.com

* *Admitted pro hac vice*

VOL. I TABLE OF CONTENTS

VOL. II TABLE OF CONTENTS

IN THE
SUPREME COURT OF WISCONSIN

REBECCA CLARKE, et al.,

Plaintiffs,

GOVERNOR TONY EVERS, in his official capacity, et al.,

Intervenor-Plaintiffs.

v.

WISCONSIN ELECTION COMMISSION, et al.,

Defendants,

and,

WISCONSIN LEGISLATURE, et al.,

Intervenor-Defendants.

No. 2023AP001399-OA

EXPERT REPORT OF SEAN P. TRENDE, Ph.D.

Table of Contents

1 Executive Summary

In this report, I use peer-reviewed statistical techniques commonly employed by political scientists and mathematicians to explore the political geography of the state of Wisconsin. A qualitative analysis of the spatial distribution of precinct-level returns in the state demonstrates that Democratic votes are heavily concentrated in the Milwaukee and Madison counties, and in small towns and cities across the Wisconsin countryside. Because of this, we would expect that it would be difficult to draw districts that would enable Democrats to achieve representation in the legislature proportional to their overall vote share.

This is confirmed via simulation analysis. Over a variety of specifications and constraints, using different elections, we see a consistent tendency for Wisconsin's political geography to make it difficult for Democrats to achieve parity in representation while adhering to traditional redistricting principles. This raises important normative questions about the purpose of single member district-based systems of representation. The choice of such a system is not a neutral one; embedded in the concept is an assumption that geography is an important indicator of the interests that may be at stake in a legislature. The degree to which concepts of partisan proportionality – which may be more directly addressed by the adoption of proportional representation – should be used to evaluate single member districts is a thorny one.

In this report, I do not take any position on whether any map is a gerrymander or not. I have not evaluated or even seen maps proposed by any parties. Instead, this report focuses solely on the political geography of Wisconsin.

2 Expert Qualifications

2.1 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 fulltime 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.

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.

I am also a Lecturer at The Ohio State University.

2.2 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. 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. My focus was researching the history of and writing descriptions for many of the 2012 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.

I have spoken on these 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 invited to present by the United States Embassy in Italy, but was unable to do so because of my teaching schedule.

2.3 Education

I received my Ph.D. in political science at The Ohio State University in 2023. I passed comprehensive examinations in both methods and American Politics. The first chapter of my dissertation involves voting patterns on the Supreme Court from 1900 to 1945; the second chapter involves the application of integrated nested LaPlace approximations to enable the incorporation of spatial statistical analysis in the study of United States elections. The third chapter of the dissertation involves the use of communities of interest in redistricting simulations. In pursuit of this degree, I 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. I also earned a B.A. from Yale University in history and political science in 1995, a Juris Doctor from Duke University in 2001, and a Master's Degree in political science from Duke University in 2001.

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 Springs 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. I also taught survey methodology in Fall of 2022 and Spring of 2024.

2.4 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.or` g/?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.

3 Scope of Engagement

I was hired by Consovoy McCarthy on behalf of the Wisconsin State Assembly and the Wisconsin State Senate (collectively, the "Legislature") in this redistricting litigation. I was asked to evaluate the physical geography of Wisconsin, to determine whether it provides any "natural" benefit to one party or the other. Unlike other similar engagements, the goal here was not to determine whether or not any particular map reflects an "extreme" gerrymander. Rather, it was simply to determine whether or not a map drawn without partisan cues would tend to benefit one party or the other, or whether it would be "neutral."

4 Method

For this litigation, I have conducted a simulation analysis of Wisconsin. Simulation analysis is widespread in political science and is the subject of one of my dissertation papers. The simulation approach to redistricting has been accepted in multiple courts, including state courts in Maryland, New York, Ohio, North Carolina and Pennsylvania. *See Szeliga v. Lamone* (2022); *Harkenrider v. Hochul* (2022); *League of Women Voters of Ohio v. Ohio Redistricting Commission* (2021); *Harper v. Hall* (2021); *Common Cause* *v. Lewis* (2019); *Harper v. Lewis* (2019); *League of Women Voters of Pennsylvania v. Com.* (2018). For this report, I have employed a broadly accepted "package" in R [1] 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 Jrnl. Computational and Graphical Statistics 715 (2020); McCartan, Cory and Kosuke Imai, "Sequential Monte Carlo for Sampling Balanced and Compact Redistricting Plans." 17 *Annals of Applied Statistics*, 3300 (2023).

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. 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 the particular technique employed here works, imagine the following cluster of seven hexagons as a cluster of precincts (in graph parlance, "nodes"), 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 (somewhat counterintuitively called "edges") that connect the hexagons. The top "precinct" therefore shares a border with the center, top right, and top left precincts; the top left "precinct" shares a border with the top, center, and bottom left precincts; and so forth.

It is possible, however, to imagine removing one of these lines. We would effectively be declaring two precincts non-contiguous. 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., Kruskal, J.B., "On the Shortest Spanning Tree of a Graph and the Traveling Salesman

[1] R is a computer programming language that is specially configured for statistical analysis. It is widely used in among social scientists and statisticians both in universities and private practice.

Problem," 7 *Proc. Amer. Math Soc.* 48 (1956), and it lies at the heart of the redistricting algorithm.

For any set of more than two precincts, there will usually 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: Example of two "precinct maps" overlaid with spanning trees

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 is 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: Precincts with edges removed, and then with precincts merged to form districts.

This, then, is a microcosm of the approach that the redist package takes. To simplify greatly, by sampling spanning trees of Wisconsin's precincts (after removing three Senate and nine Assembly districts to address VRA concerns) and then removing 29 connections for the Senate and 89 for the Assembly, the software produces 30 randomly drawn Senate districts and 90 randomly drawn Assembly districts. While the math is quite complicated, this approach produces a random sample of maps that mirrors the overall distribution of maps, much as 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.

Importantly, these maps are drawn without providing the software with any political information. In other words, these maps help inform an analyst of what maps would tend to look like in Wisconsin 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 state law by drawing districts that will be largely equipopulous. The simulation allows a population tolerance of +/- 1%. While this is a greater population tolerance than "official" Wisconsin maps allow, that is not a problem for our purposes. 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 either splitting precincts at the block level or by slightly altering the particular precincts used in a given district can almost always be achieved. However, this cannot alter the political orientation of these districts substantially, as a 1% change in population typically can't alter political outcomes by more than a percentage point in either direction. 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 was saved until later. *See* Bernard Grofman, Ph.D. & Sean Trende, Memorandum re Redistricting Maps, Dec. 27, 2021, at 8, 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, (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).

5 Analysis of Wisconsin's Political Geography

5.1 Political Geography of Wisconsin and the meaning of the term "gerrymander."

Political scientists have long understood that the geographic concentration of partisans can distort the traditional relationship between a party's vote share and their seats (Johnston and Hughes, 1978; Johnston, 2002; Moore 2002; Hirsch 2004; Chen and Rodden 2013). This type of "unintentional gerrymandering" is a fixture of first-past-the-post systems. This, then, gets to a core normative question in redistricting: Is a non-gerrymandered one drawn without respect to politics? Or is it a map drawn with a certain relationship between votes cast and seats won by a party? This is particularly important in first-past-the-post systems, where the entire normative justification for the system (as opposed to a system of proportional representation) is that geographic representation matters independent of partisanship. (Stephanopoulos 2013).

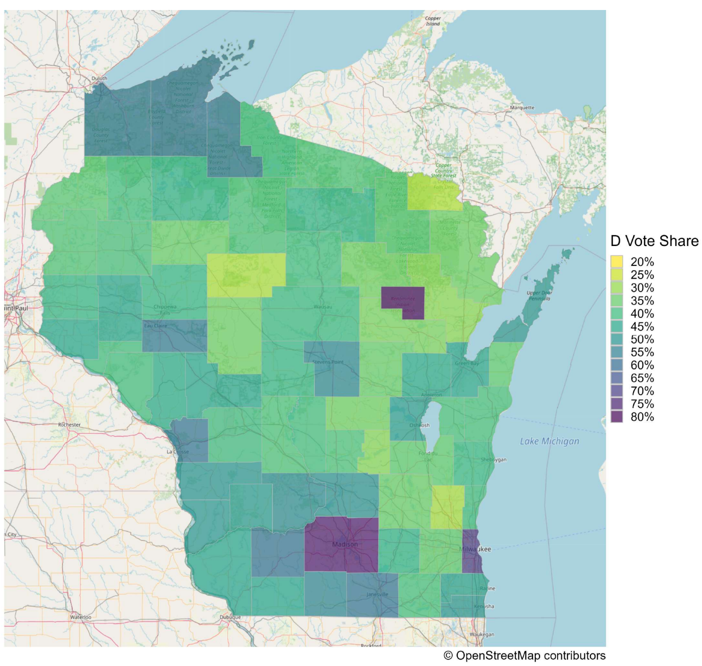
In America, this geographic sorting of partisans has tended to hurt Democrats and help Republicans, as Democrats find their votes concentration is densely packed cities and urban areas. Of course, one cannot blithely assume that this will hurt Democrats in Wisconsin. Instead, it must be tested. It does, however, raise an important philosophical question that must be answered before proceeding meaningfully to examine the partisanship of maps: What exactly is a gerrymander? If a state's "baseline" partisanship would yield a mean-median score of 0.02, and a map has a mean-median score of 0.03, does that represent a map distorted by 0.01 points, or 0.03 points? This, of course, is antecedent to the next question: "How much partisan unfairness is too much?"

To test this, I created an "index" of votes cast for each party. This includes the

2016 presidential and senate elections, the 2018 senate, gubernatorial, attorney general, secretary of state, and treasurer elections, the 2020 presidential election, and the 2022 senate, gubernatorial, attorney general, secretary of state, and treasurer elections. Republican and Democratic vote shares in all of these elections were summarized into the index, to minimize the potential impact of any one race.

In total, Democrats won 16,254,999 votes across these elections, while Republicans won 15,989,428. The problem Democrats face, however, is that they won 5,838,876 votes, or almost 36% of their vote totals, in Dane and Milwaukee counties alone. During this time period, Democrats have won the majority of the vote in 15 counties; Republicans have carried the remaining 57. We can see this distribution in the following map:

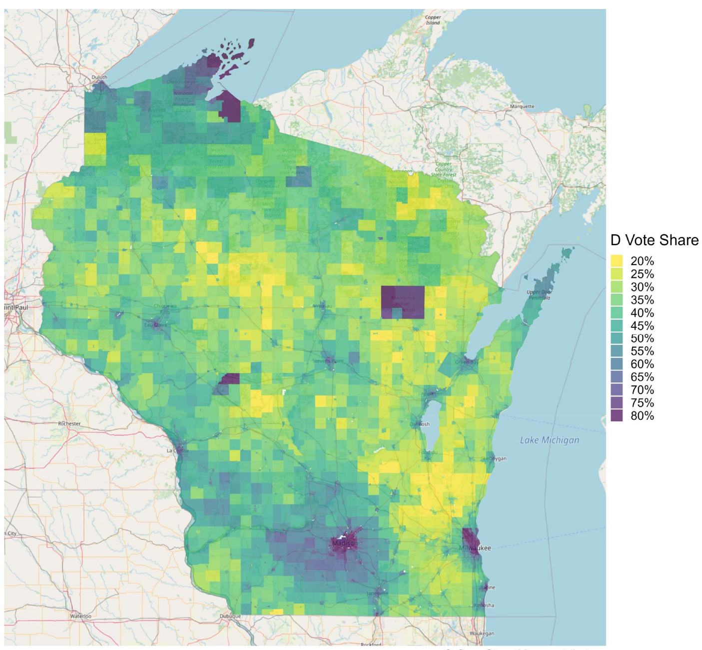
Figure 3: Democratic voting strength in Wisconsin's counties, using a political index of statewide non-judicial state and federal elections from 2016 - 2022



This is not to say that Republicans don't have their own areas of political concentration. The "WOW" counties around Milwaukee tend to show high Republican vote shares, as do some of the rural counties in the northeastern portion of the state. But even this poses its own challenges for Democrats, as these counties tend to form envelopes around Milwaukee that can further limit the number of Democratic-leaning districts that can be drawn out of urban cores.

We can further see this by examining the partisanship of precincts in Wisconsin. Note that for this map I have truncated partisanship at 20% and 80% (that is, precincts with index scores under 20% or over 80% will be represented at 25% or 80%). The reason for this is simple: allowing partisanship to range down to 0% or up to 100% would allow overwhelmingly Republican or Democratic precincts to dominate the map, and would hide partisan differentiations closer to the center of the distribution of precincts. I typically do this in my redistricting work.

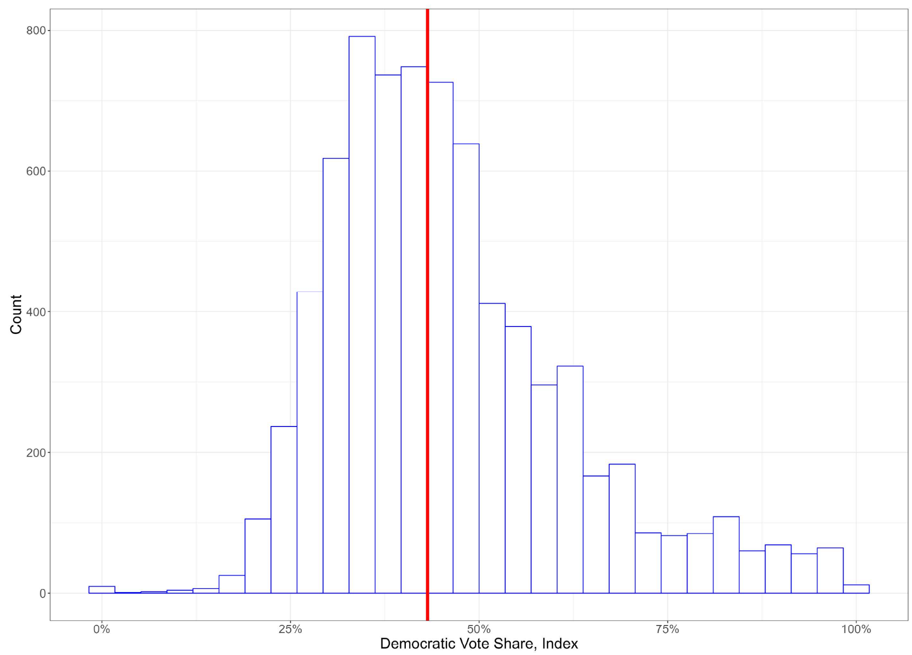
Figure 4: Democratic voting strength in Wisconsin's VTDs, using a political index of statewide non-judicial state and federal elections from 2016 - 2022



In any event, looking at the precinct level plainly reveals the pattern in Wisconsin:

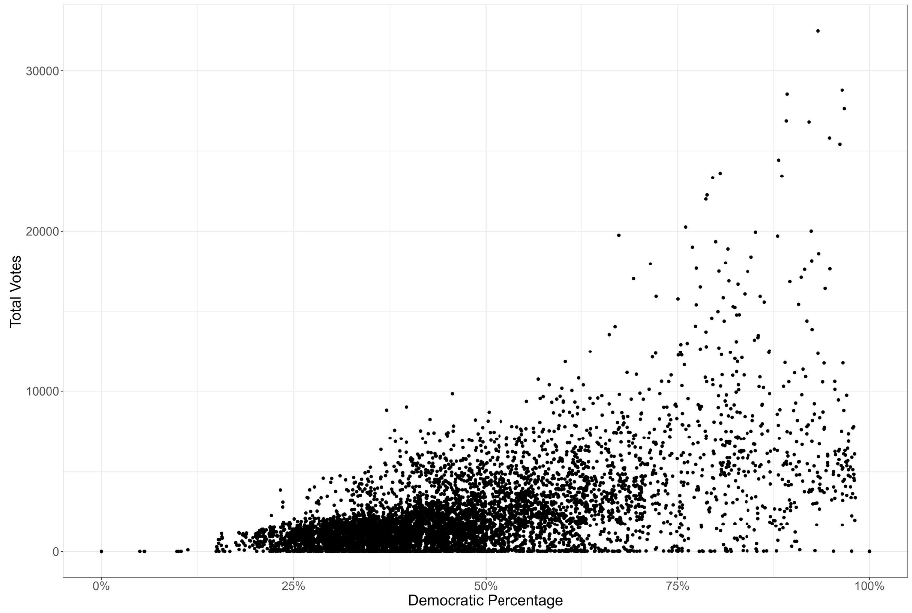
Democrats vote in islands in Milwaukee and Dane counties, with in a few other pockets of Democratic strength in the North around Ashland and in smaller towns and cities across the countryside. As a result of this, it is unsurprising that, even though Democrats have won a majority of the votes in Wisconsin, the median precinct gave them just 43% of the vote. The following histogram illustrates the distribution of partisanship with respect to the index of races. Note too the thicker tail to the right of the chart. Democrats have over 500 precincts where their vote share tops 75%, while Republicans have just 300 where their vote share is under 25%.

Figure 5: Histogram of Democratic voting strength in Wisconsin VTDs from 2016 - 2022



Of course, as the saying goes, land doesn't vote, people do. Many of these Democratic precincts have more total votes cast as well. As you can see below, as precincts become more heavily Democratic, the total number of votes cast tend to increase. So while this qualitative analysis might help us set a prior, or a starting belief, that Wisconsin's political geography tends to disadvantage Democrats, we should be prepared to update that belief when presented with more compelling statistical evidence.

Figure 6: Democratic Voting Strength in Wisconsin VTDs from 2016 - 2022 by VTD population



Thus, while we might begin with a sense that the political geography of Wisconsin results in at least some concentration of Democratic votes in Wisconsin, we need a more rigorous exploration of this to be certain. Political scientists traditionally utilize simulation analyses to explore this. This is what the remainder of this report is dedicated to.

5.2 Unconstrained Simulations

My first run of simulations contained as few constraints as possible. The simulations were required to produce districts that are contiguous and reasonably compact, but were not forced to follow any pariticular city or county boundaries. All precincts from Senate districts 3, 4 and 6, and the accompanying precincts from Assembly Districts 7, 8, 9, 10, 11, 12, 16, 17 and 18 were frozen so that those districts could not be altered.

This is intended to ensure Voting Rights Act compliance, as these districts trace their lineage back to the *Baldus* litigation from the early 2010s.

I utilized the LTSB blocks without water as the basis for my simulations. Additional political data, including block-level data from the 2016, 2018, 2020 and 2022 elections, were taken from the Redistricting Data Hub, and were then aggregated to the ward, precinct, and district levels. Other geographic and census data were obtained through the Tigris and Tidycensus packages in R.

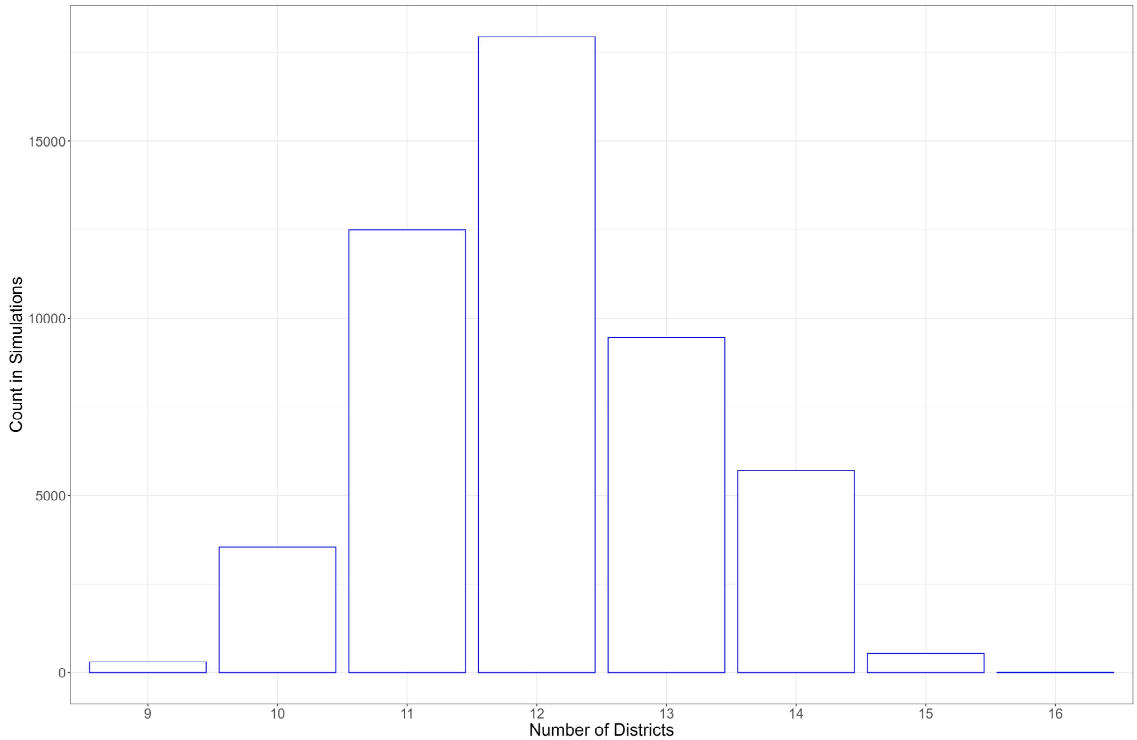
For the initial simulations, I pulled 50,000 maps. For non-contiguous precincts, the precinct was split. For example, if a precinct had three distinct geographic spaces (that is, three separate polygons), it was split into three different precincts; since it was built up from the block level, all population and election information should still be accurate. I treated non-contiguous cities the same way. Cities that split county lines were also treated as two cities. In my experience, this is similar to how map drawers treated non-contiguous cities in North Carolina and Ohio.

In the interest of brevity, I present data for the 2020 U.S. Presidential Election and the combined political index of statewide, non-judicial races from 2016 to 2022. I do not have any reason, however, to believe that using other individual races would produce significantly different results.

5.2.1 Senate Analysis

We examine the Senate first. The histograms reflect the distribution of the number of districts won by the Democrats under the ensembles. I will explain this more using the 2020 Presidential election as a reference point:

Figure 7: Number of Simulated Senate Districts won by Pres. Joe Biden, 2020 data

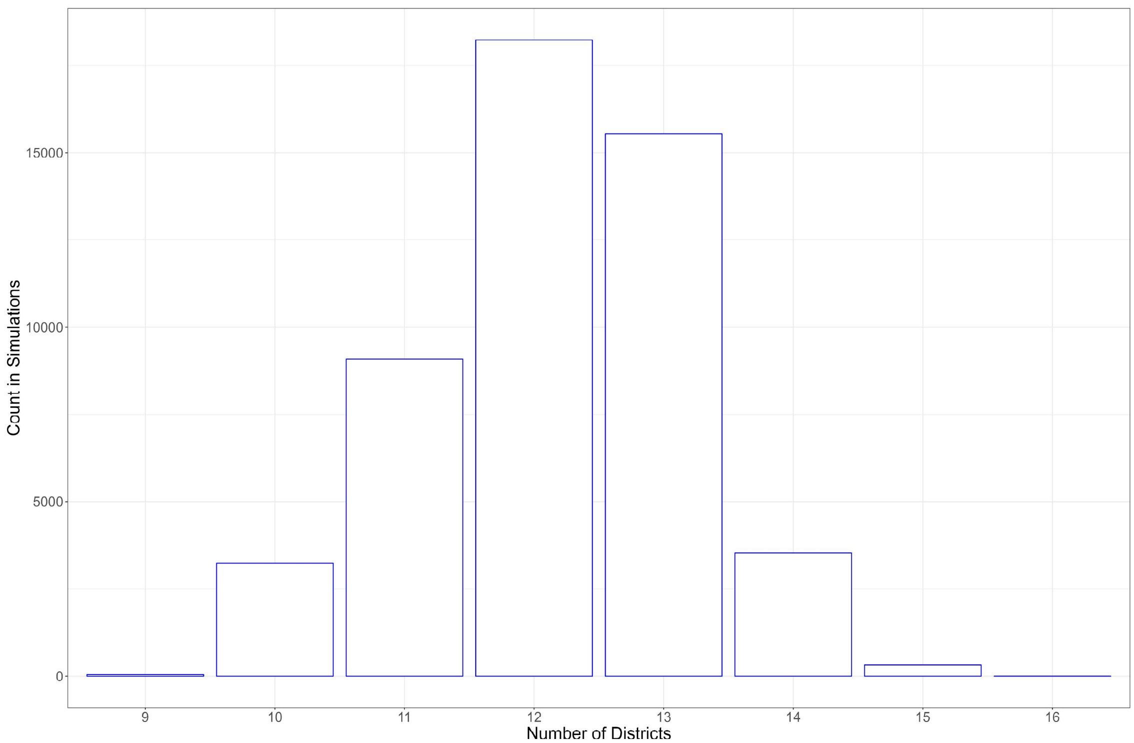


The Senate has 33 seats, so 17 seats are needed for a majority. Looking at the above data, the maps drawn without respect to politics produce no maps where Pres. Joe Biden carried more than 16 senate districts. There are around 200 maps where he carried 15 districts, around 6,000 where he carried 14 districts, and so forth. The modal outcome is 12 districts carried by Biden.

Note that we shouldn't confuse a Biden-won district with a Democratic district. After all, Biden won nationally by four points; relative to the partisanship of the country as a whole, a 50-50 Biden district has a slight Republican tilt. Rather, this is just one way to look at a map to determine what type of outcome we might expect if a map were drawn without respect to politics.

As noted above, I examine two sets of races throughout: The Biden-Trump presidential election, as well as an index of statewide non-judicial offices and federal races from 2016 to 2022. The maps rarely produce a majority of seats won by Democrats. In other words, we wouldn't expect statewide Democrats to carry a majority of the Senate districts, except perhaps in extreme circumstances, on a map drawn without respect to politics. Also recall that this is only showing who wins or loses a district, not how close the district is/was.

Figure 8: Number of Simulated Senate Districts won by statewide Democrats, 2016 - 2022 data



There are other ways that we might look at the data. For example, we might want to see the distribution of partisan fairness metrics developed by political scientists. One such partisan fairness metric is the mean-median gap. This measures the difference between a party's average vote share and its share in the median district. It is particularly relevant for state legislative districts, where the partisanship of the median district – which will tend to grant control of a chamber – is particularly relevant. A zero mean-median gap means that there is a way to win control of the chamber without having to win a district that is more Republican or Democratic than the state as a whole.

Here, we calculate the mean-median gaps for our ensembles, using both the index of races and President Biden's 2020 election results as a measure for partisanship. In both instances using the Senate, we would not expect a zero mean-median from a map drawn without respect to politics.

Figure 9: Distribution of Mean-Median scores for simulated districts, using Biden 2020 data

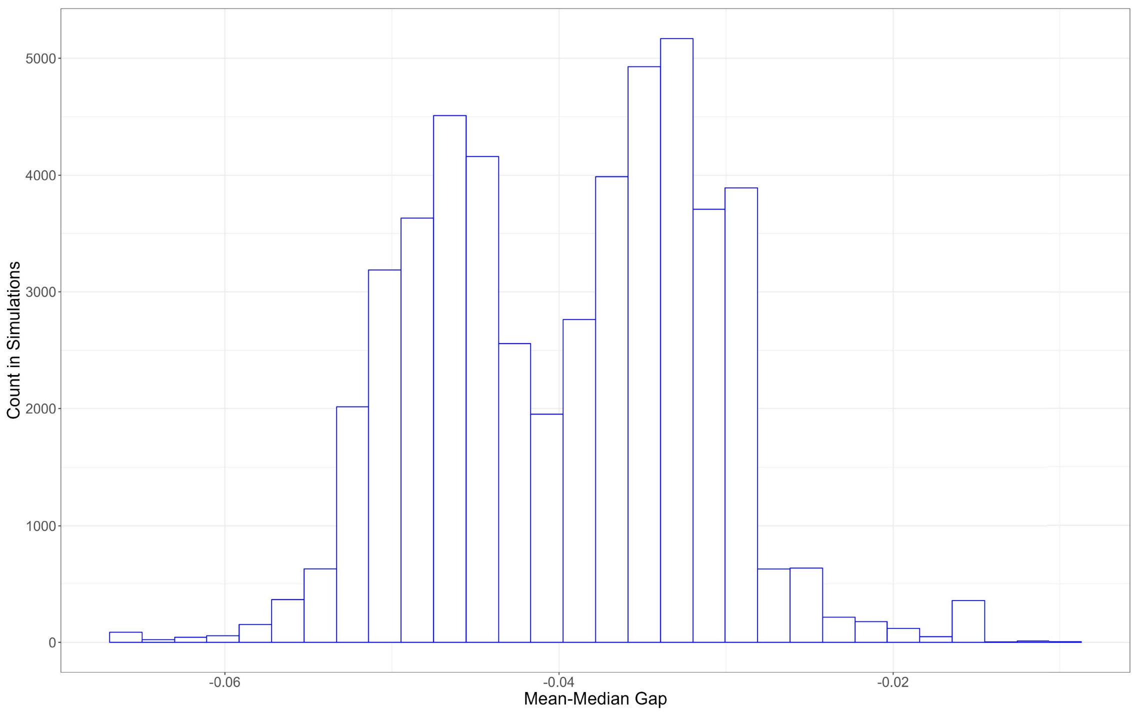
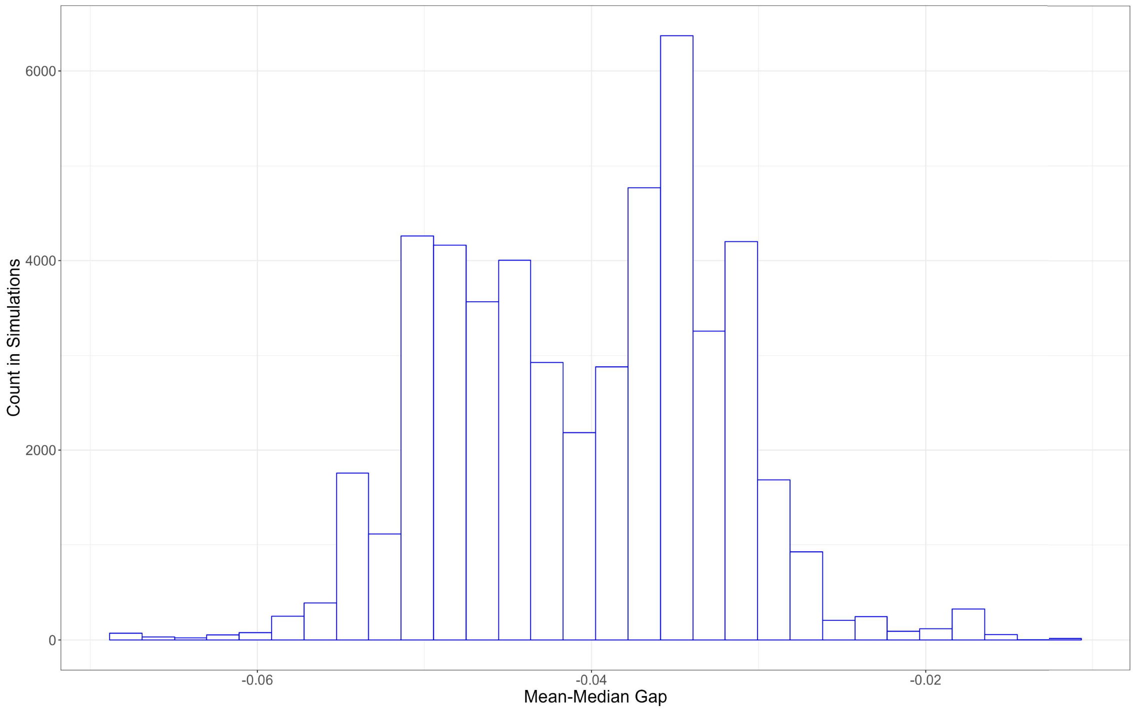


Figure 10: Distribution of Mean-Median scores for simulated districts, using statewide Democrats' 2016 - 2022 data



Finally, we might want to understand better the overall distribution of seats under a given map. As mentioned, the shortcomings of the histograms of races won and lost is that there is a difference between a seat Biden won by a point – such a seat would still be competitive – and a seat he won by 20, which would not be competitive. Likewise a mean-median analysis focuses on the seat that is pivotal for chamber control. But it might be important to also consider maps where there is effectively one path for a party to control the legislature, versus a map that offers multiple paths to both parties.

To help address this, I have previously used simulation dotplots, which give a nice summary of the distribution of all districts in a state. Consider the following Senate dotplot. All 33 districts in each of the 50,000 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 33, you will notice a cluster of blue dots at around 90% Democratic. That means in every plan, the most heavily Democratic district fell somewhere around 90% Democratic.

The next cluster to the left, hovering above the number 32, consists of blue dots ranging just below 90%. This means that in all of the 50,000 simulated maps, the second-most Democratic district typically fell just 90% Democratic. This exercise then continues until all ranks have been filled.

Figure 11: Distribution of vote share in simulated districts using Biden 2020 data

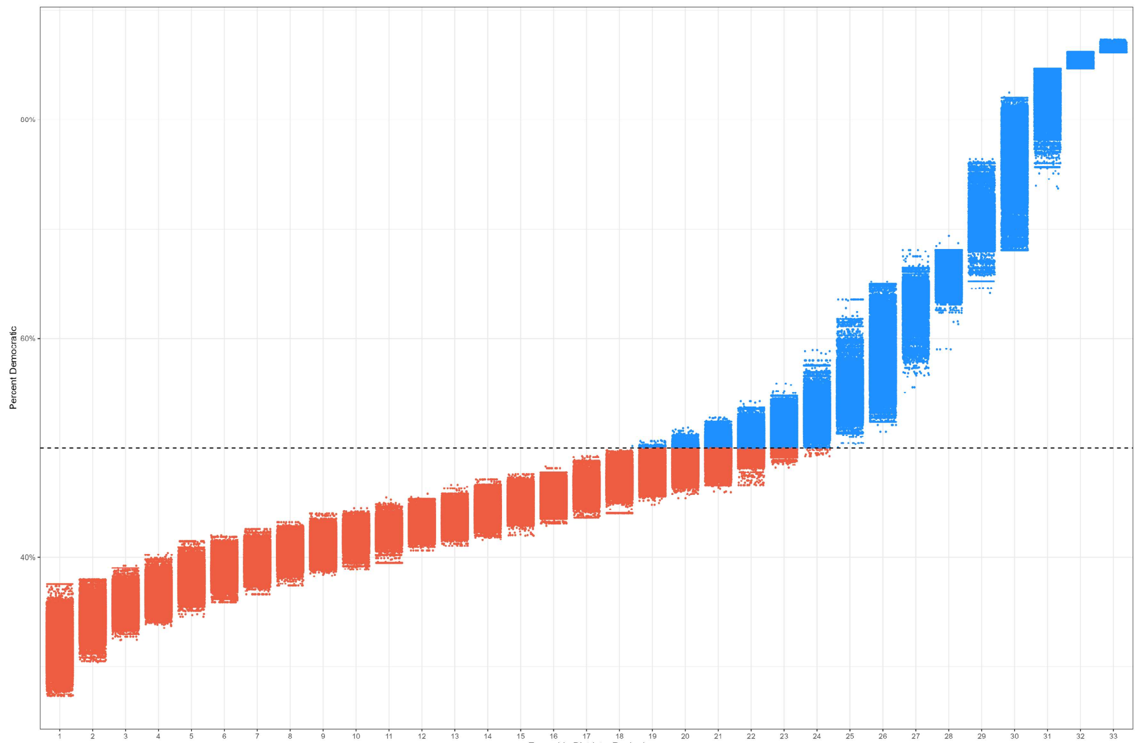
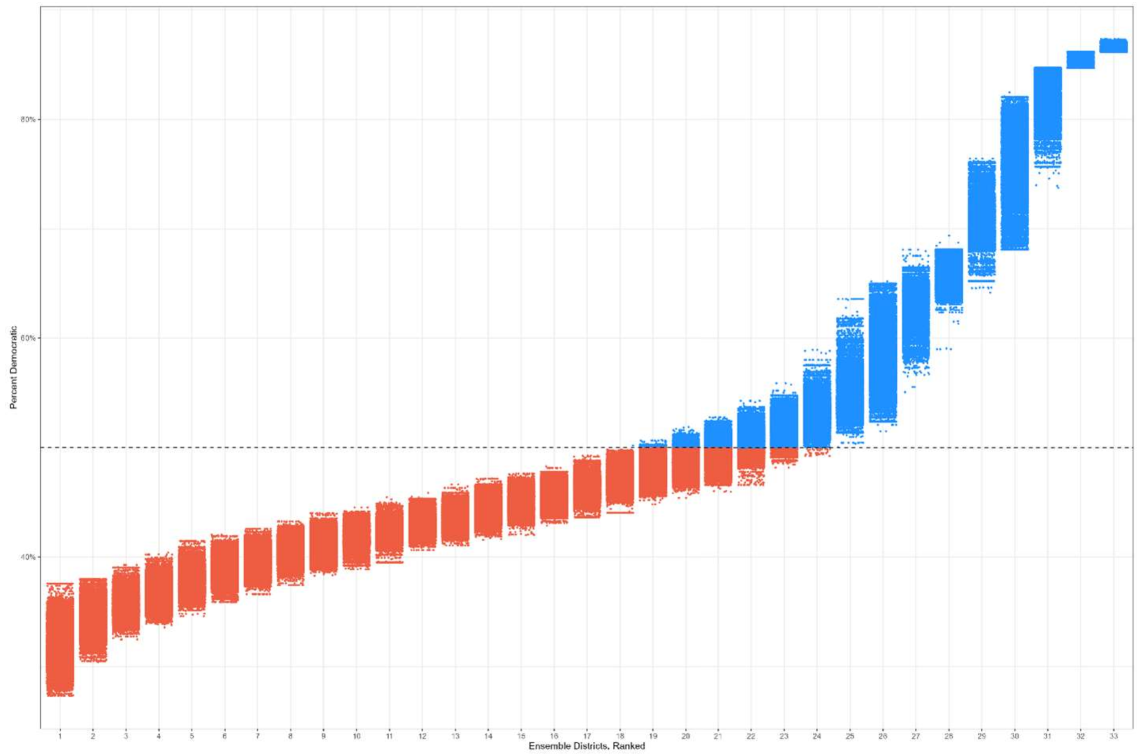


Figure 12: Distribution of vote share in simulated districts using statewide Democrats' 2016 - 2022 data

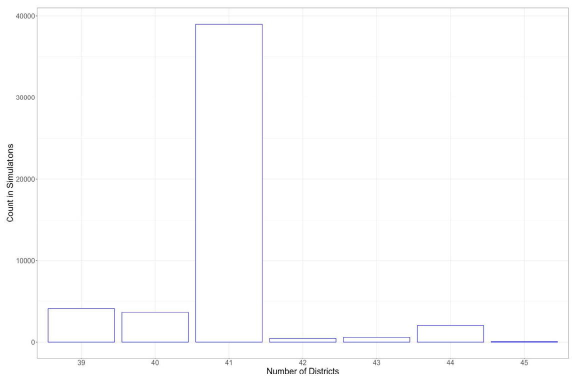


As you can see, in some areas there is quite a bit of variation in what the maps draw. In the 26th most Democratic district, for example, Democratic performance ranges from around 52% Democratic to around 65% Democratic. Other districts have tighter ranges. This reflects the national variation that occurs. In fact, if the dotplot is inverted and rotated such that the rank order is on the y-axis and the Percent Democratic is on the x-axis, the dotplots produce an empirical seats-to-votes curve for the state. Regardless, we can see that politics-neutral draws don't produce maps where Democrats have won a majority of the districts. Moreover, moving rightward on the chart, we can see that the map quickly begins to produce a large number of heavily Democratic districts, effectively wasting a large number of votes for that party naturally, while the Republican districts gradually drift away from the 50-50 mark. We see the same thing using Pres. Biden's numbers to measure partisanship. In fact, District 17 (the "majority-making district") tends to favor Trump by about ten points.

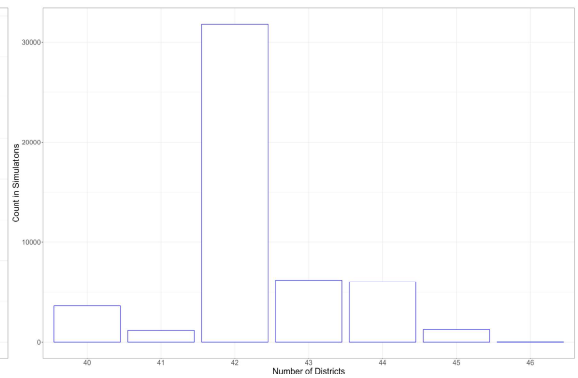
5.2.2 Assembly Analysis

The Assembly is a similar story. To win a majority of Assembly seat a party must capture 50 seats. That does not happen in the simulated maps.

Figure 13: Number of Simulated Assembly Districts won



(a) Using Biden 2020



(b) Using 2016-2022 Index

Looking at the mean-median scores of the simulations, they tend to return scores even further away from zero than the Senate simulations.

Figure 14: Distribution of Mean-Median scores for simulated Assembly districts, using Biden 2020 data

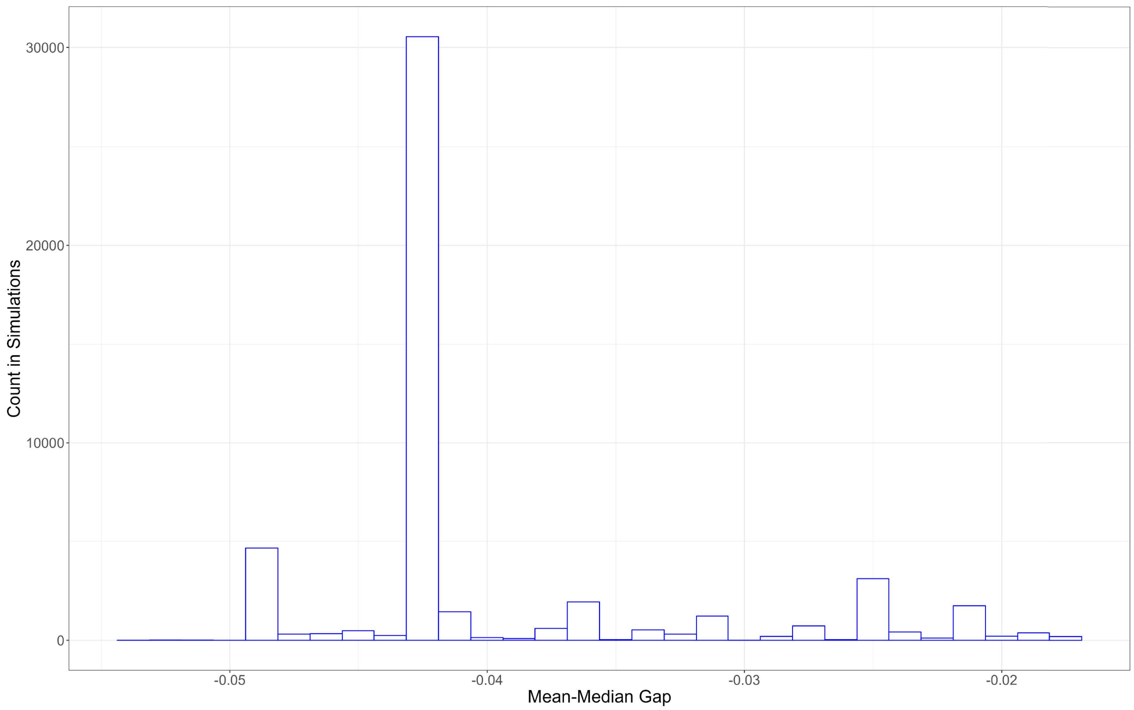
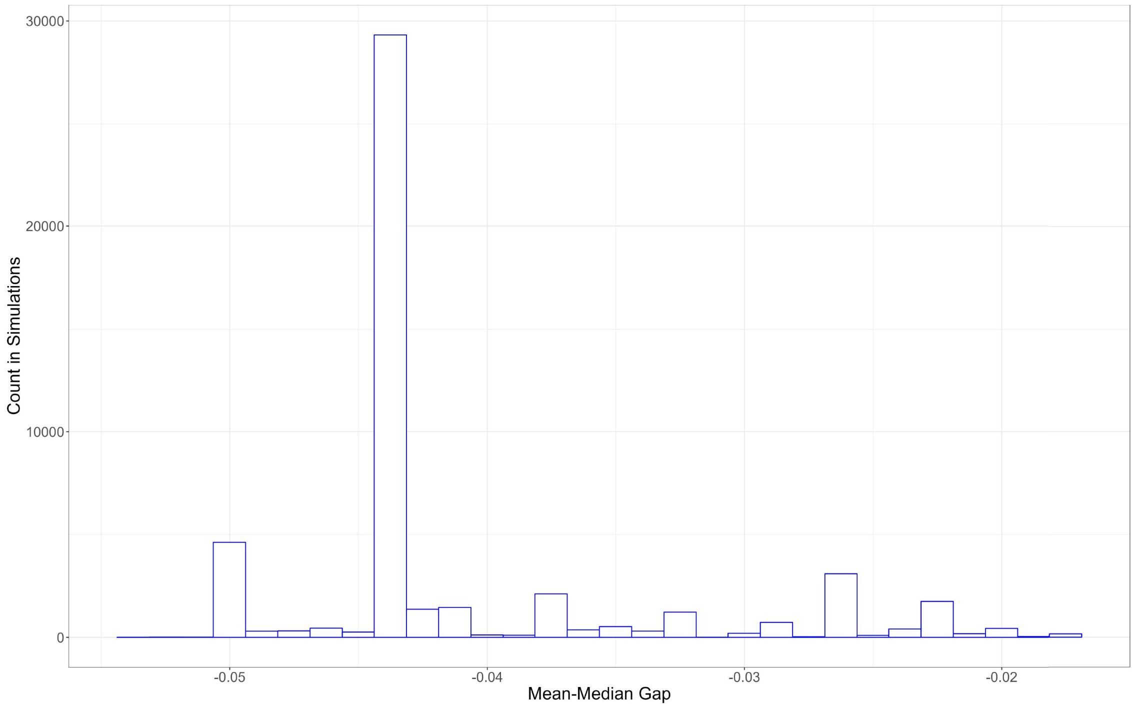


Figure 15: Distribution of Mean-Median scores for simulated Assembly districts, using statewide Democrats' 2016 - 2022 data



The dotplots further demonstrated that a politics-neutral map would not return a 50-50 Assembly, even without paying attention to political boundaries at all. The tendency is to return around 53 Republican-won districts.

Figure 16: Distribution of vote share in simulated Assembly districts using Biden 2020 data

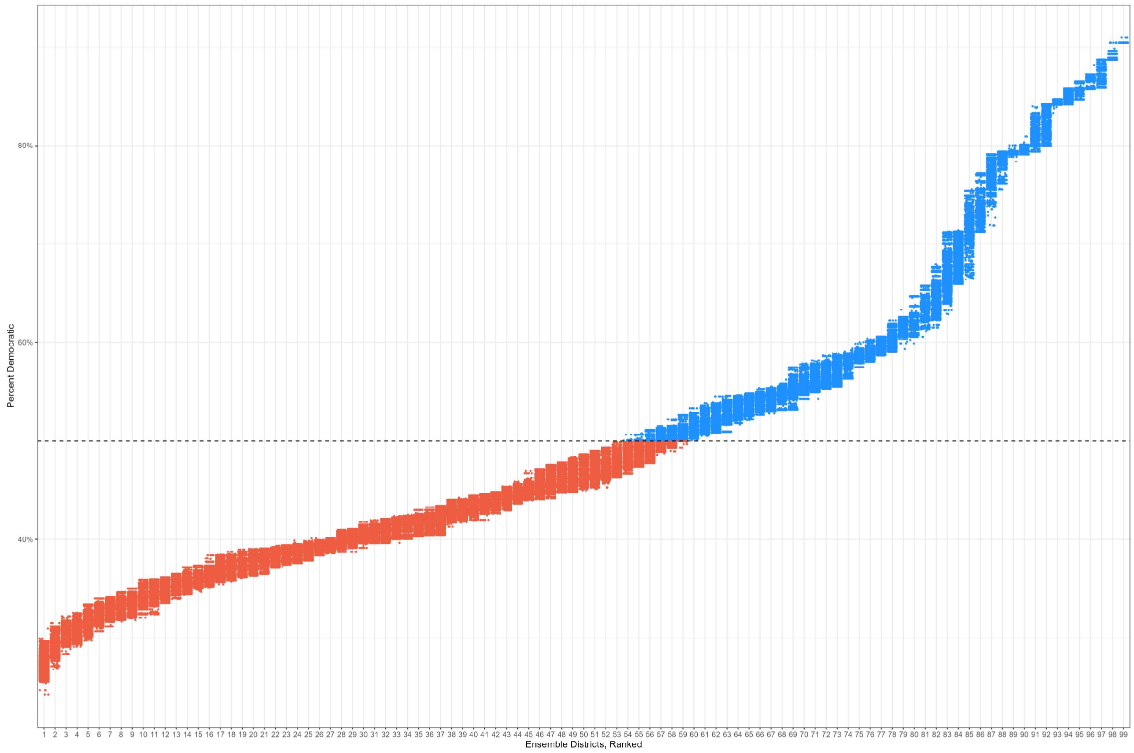
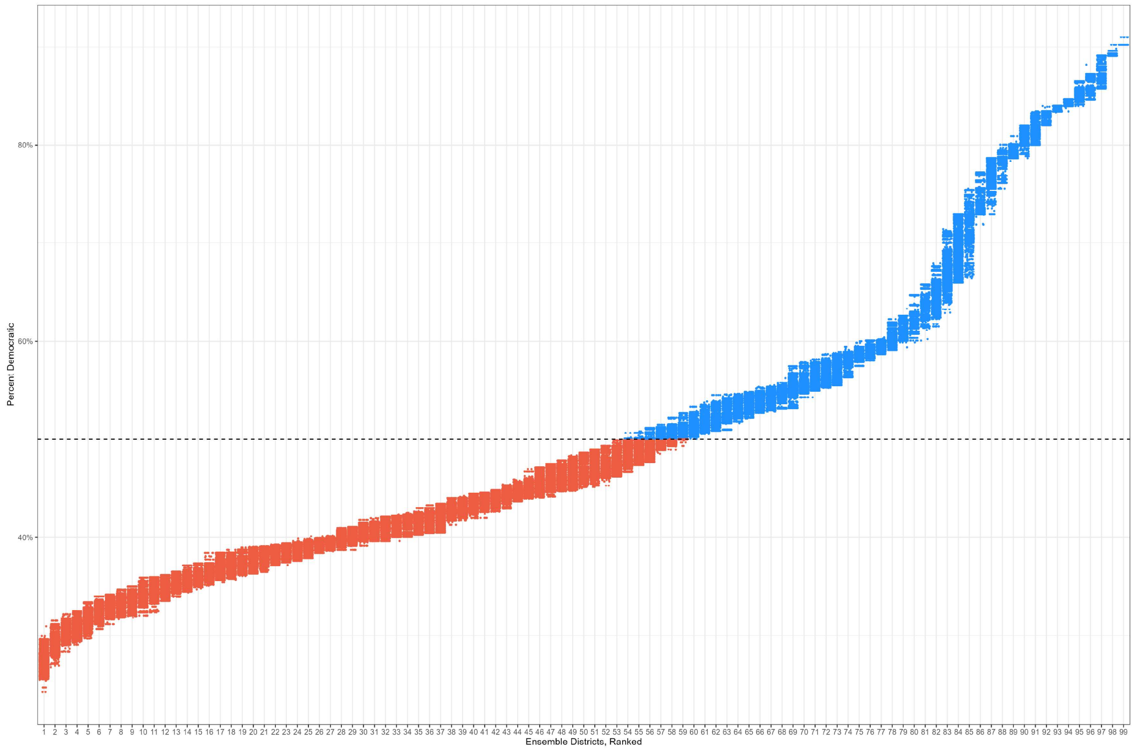


Figure 17: Distribution of vote share in simulated Assembly districts using statewide Democrats' 2016 - 2022 data



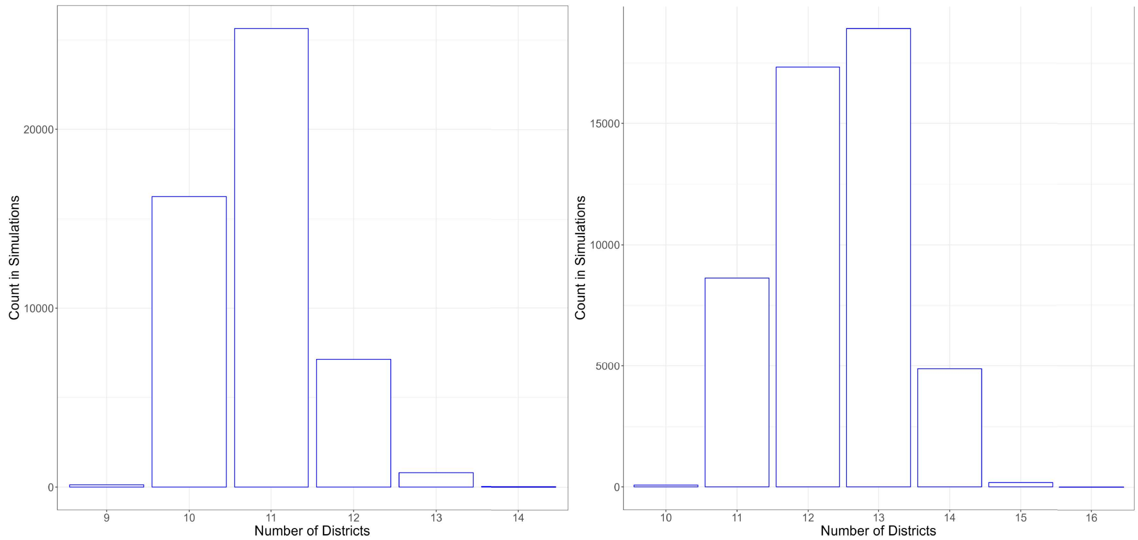
5.3 Simulations Respecting County Boundaries

Second, I ran the simulations with a constraint in place that counties could not be split more than necessary. This brings the simulations closer to the constraints that map drawers in Wisconsin would actually operate under. The conclusions are effectively the same, however: Wisconsin's geography does not naturally lead to "neutral" maps.

5.3.1 Senate Analysis

Even with the county constraint imposed, the simulations never result in a situation where Democratic candidates carry the 17 districts needed for a majority.

Figure 18: Number of Simulated Senate Districts won, counties constraint



(a) Using Biden 2020 (b) Using 2016-2022 Index

Likewise, the mean-median gaps suggest that the state's natural political geography is somewhat favorable to Republicans. The mean-median scores tend not to be zero.

Figure 19: Distribution of Mean-Median scores for simulated Senate districts, using Biden 2020 data, county constraint

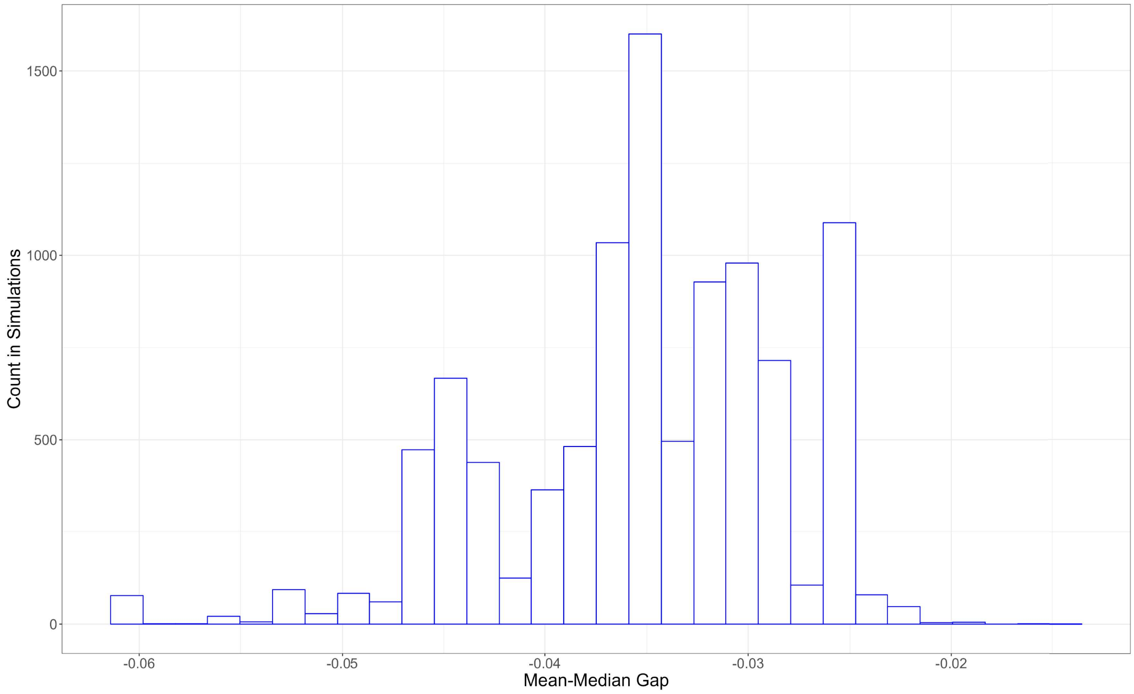
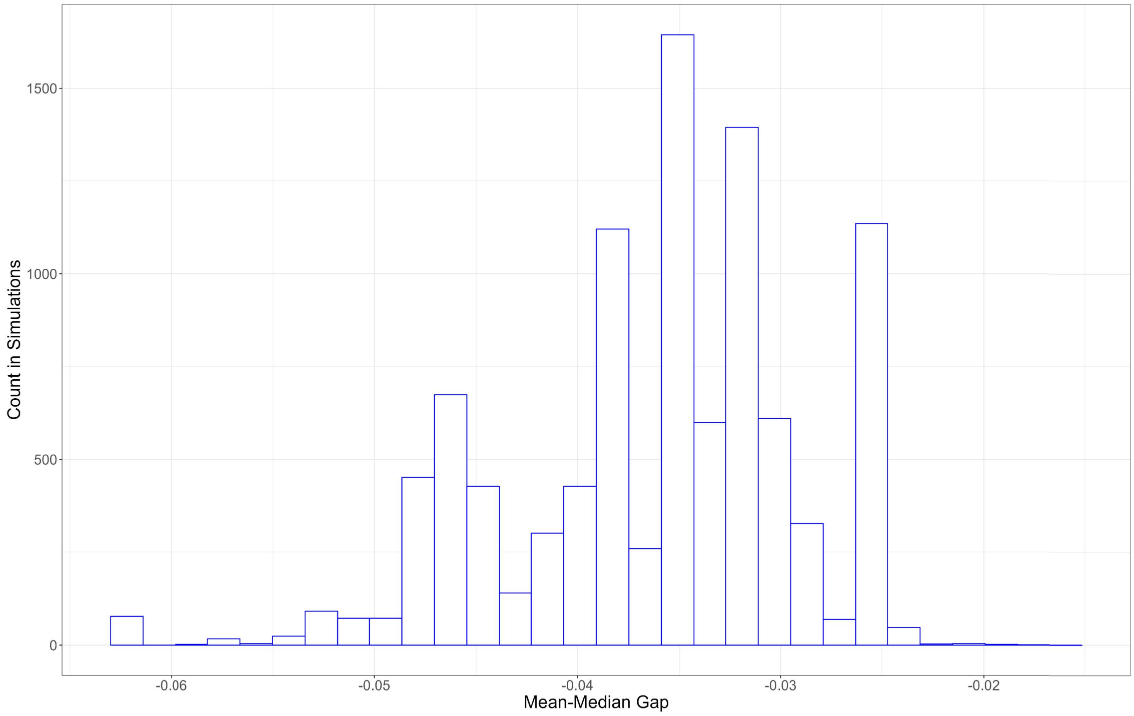


Figure 20: Distribution of Mean-Median scores for simulated Senate districts, using statewide Democrats' 2016 - 2022 data, county constraint



The same is true when we look at the ranges of partisan scoring we would expect from districts.

Figure 21: Distribution of vote share in simulated Senate districts using Biden 2020 data, county constraint

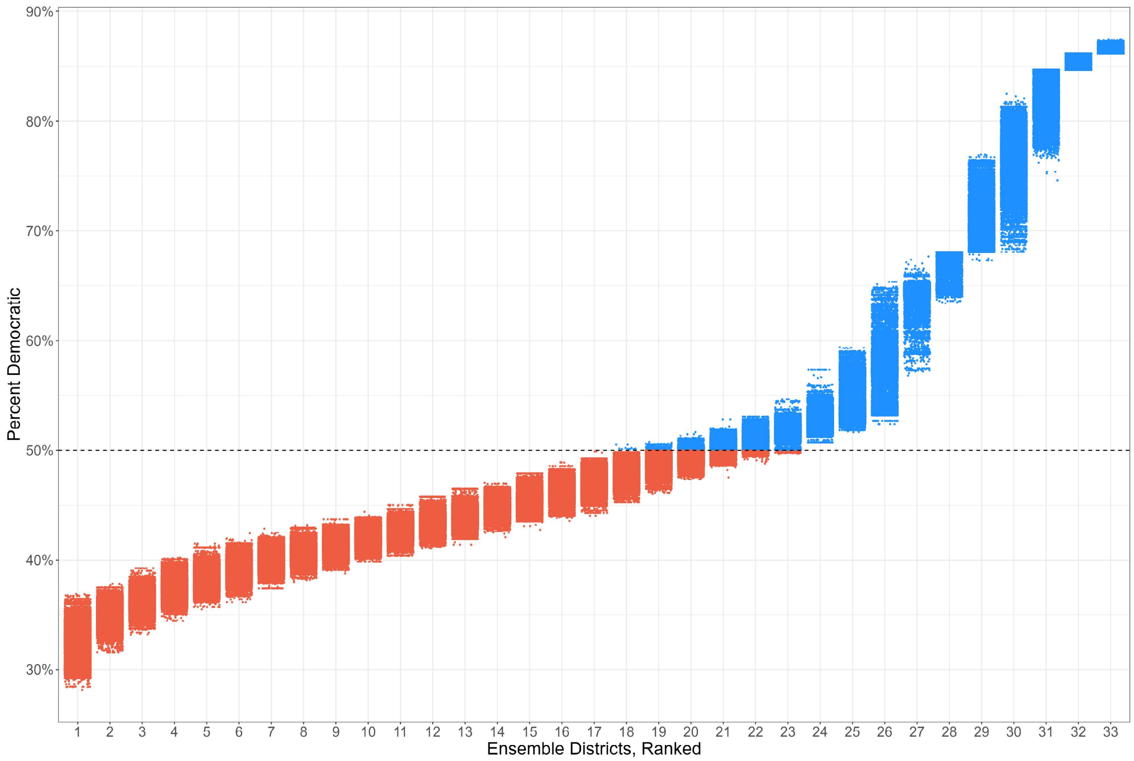
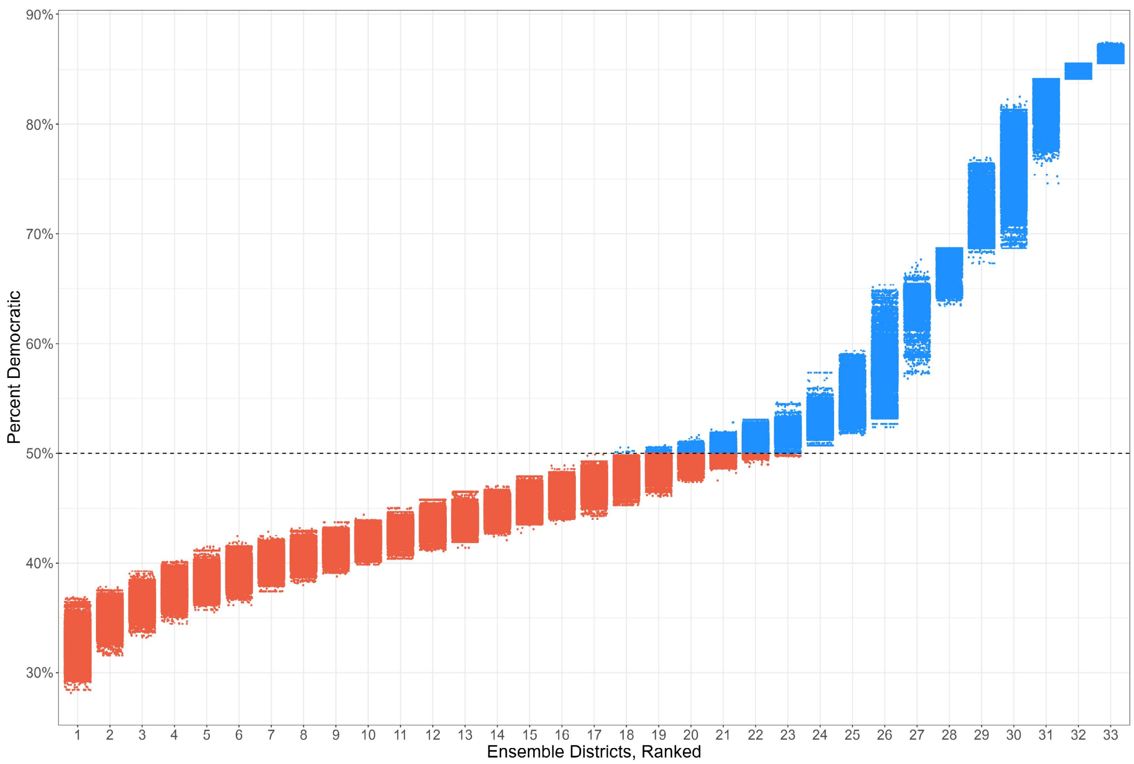


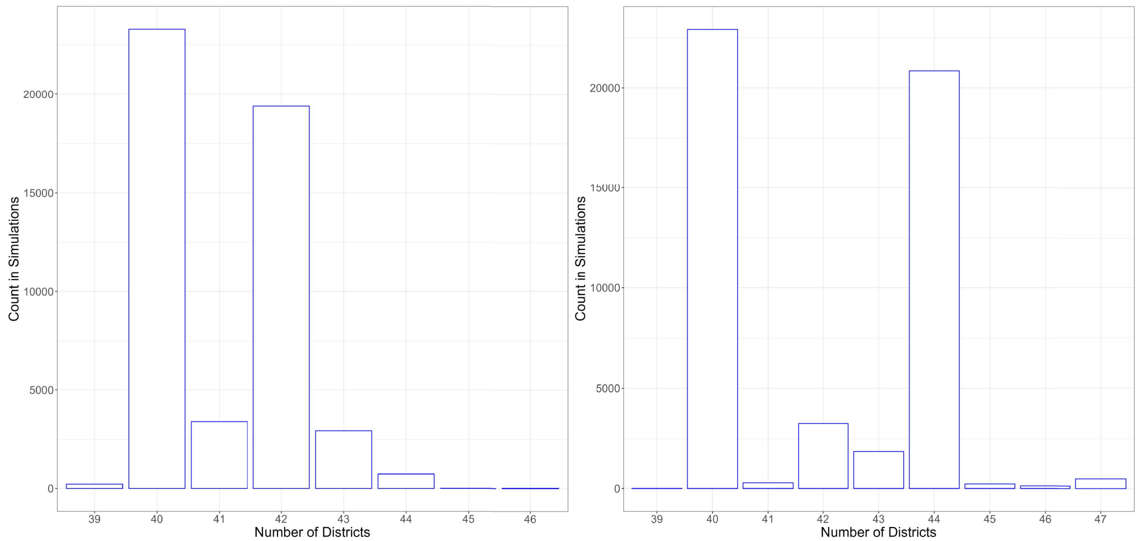
Figure 22: Distribution of vote share in simulated Senate districts using statewide Democrats' 2016 - 2022 data, county constraint



5.3.2 Assembly Analysis

Likewise, even with the constraint for keeping counties intact, the Assembly districts do not tend to cluster around a 50-50 outcome, much less tend to produce such an outcome.

Figure 23: Number of Simulated Assembly Districts won, counties constraint



(a) Using Biden 2020 (b) Using 2016-2022 Index

Unsurprisingly then, the mean-median scores for the politics-neutral maps have a varying degree of bias for Republicans.

Figure 24: Distribution of Mean-Median scores for simulated Assembly districts, using Biden 2020 data, county constraint

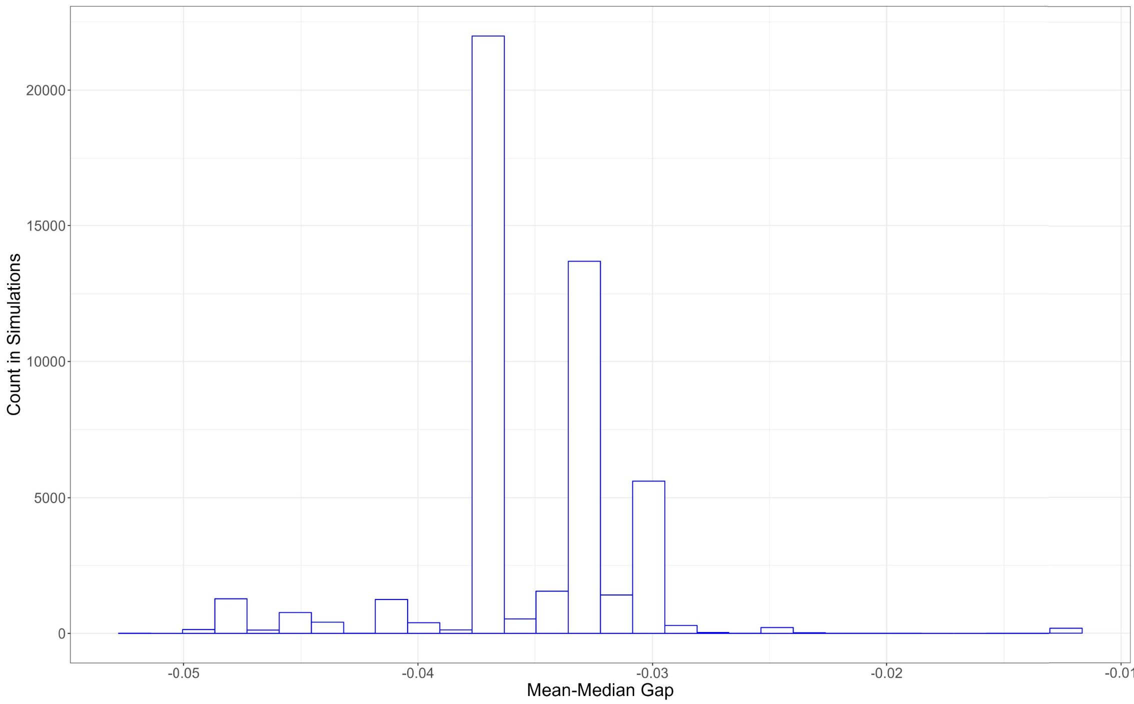
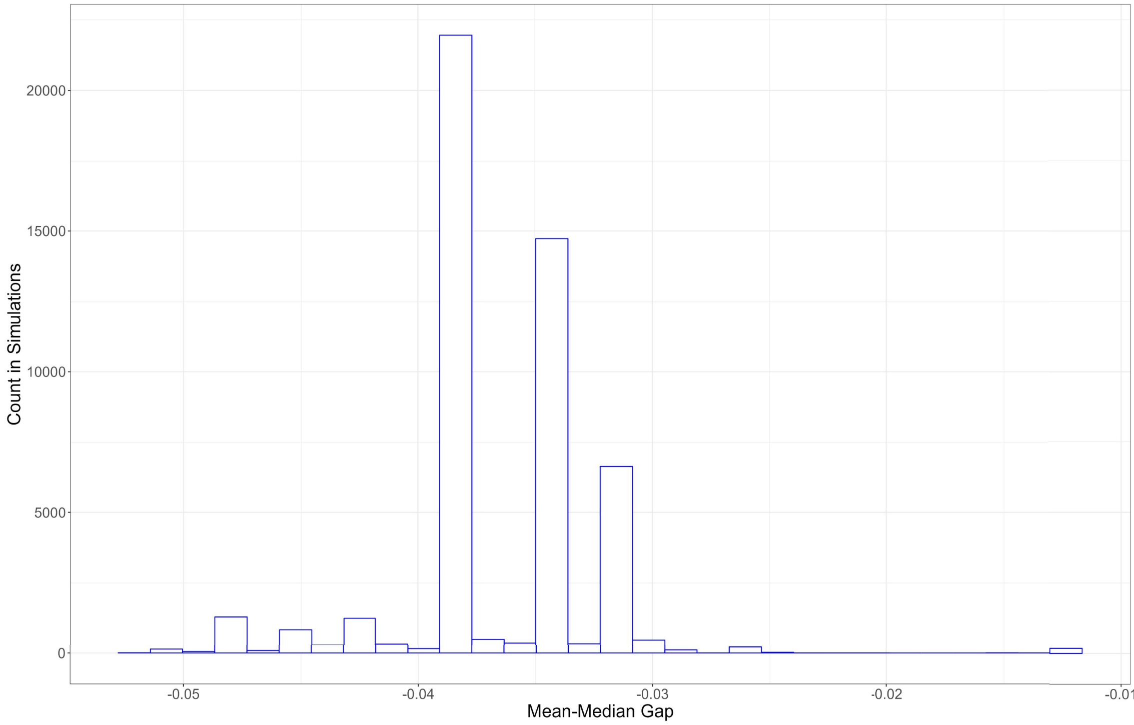


Figure 25: Distribution of Mean-Median scores for simulated Assembly districts, using statewide Democrats' 2016 - 2022 data, county constraint



Once again, the same is true when we look at the ranges of partisan scoring we would expect from districts.

Figure 26: Distribution of vote share in simulated Assembly districts using Biden 2020 data, county constraint

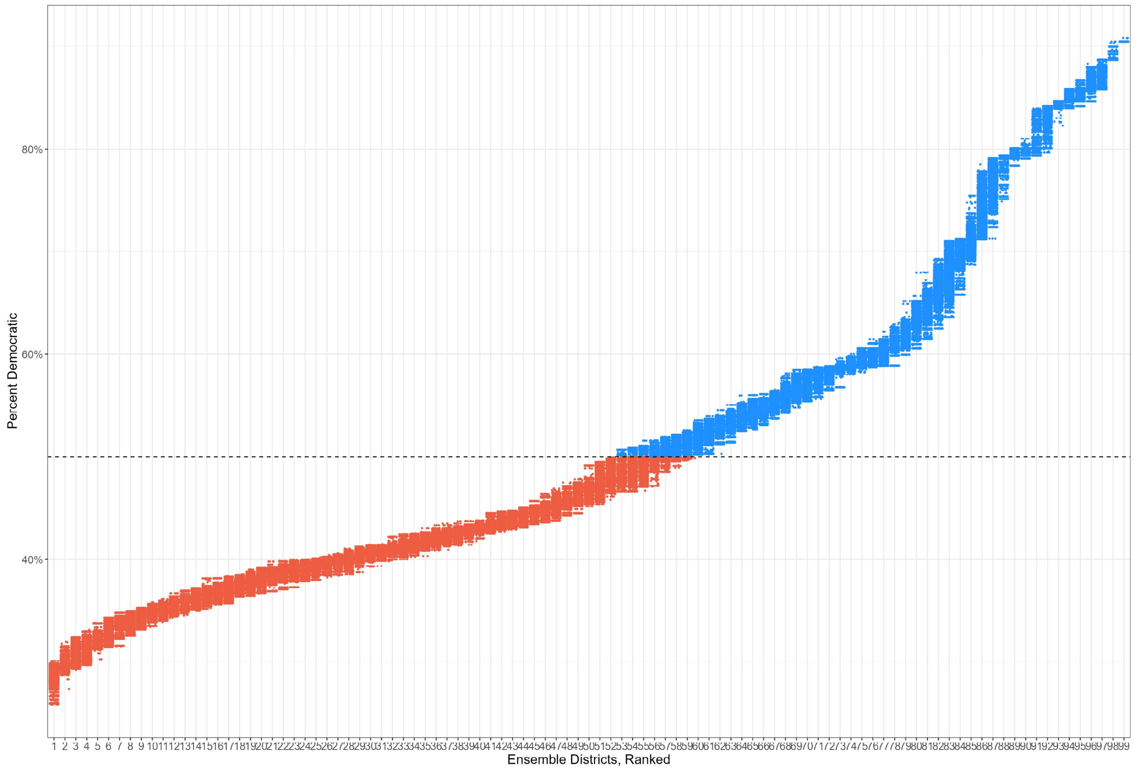
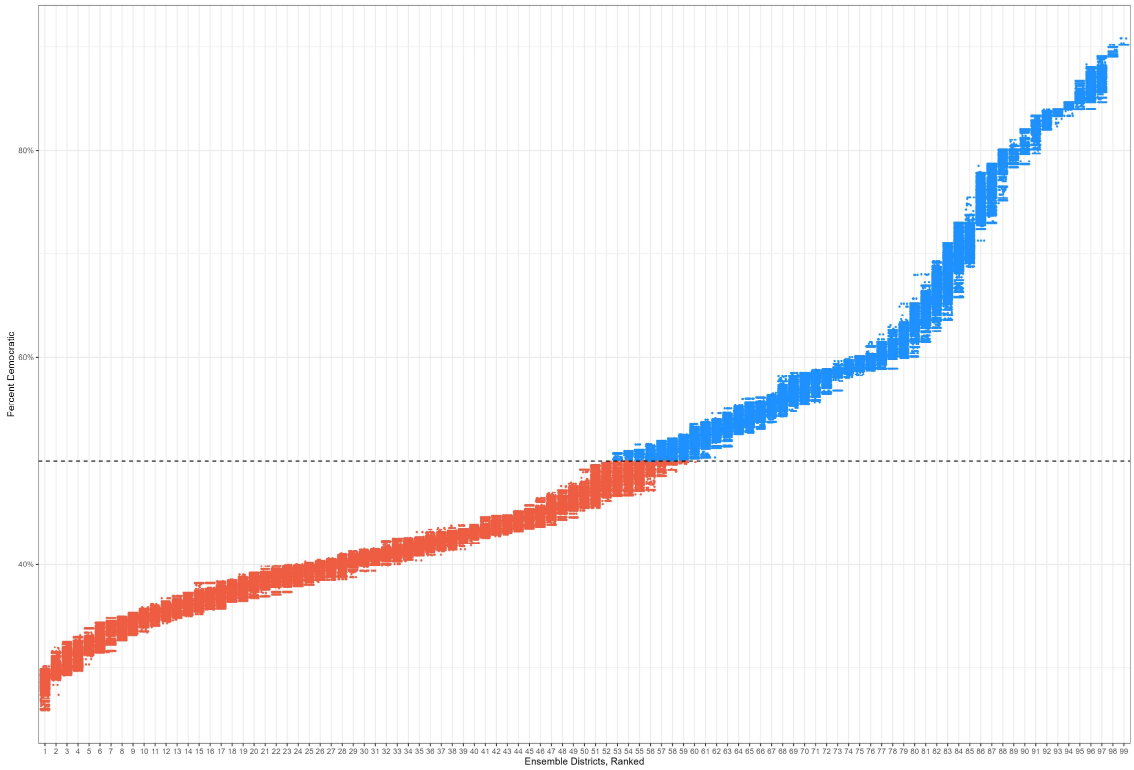


Figure 27: Distribution of vote share in simulated Assembly districts using statewide Democrats' 2016 - 2022 data, county constraint



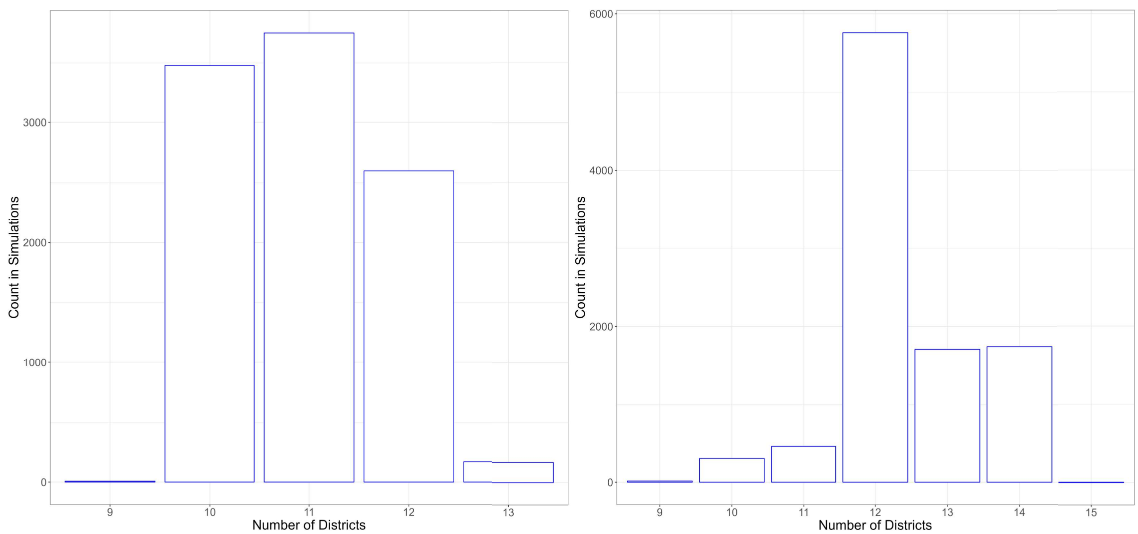
5.4 Simulations Respecting County and Town Boundaries

I next ran a set of simulations "freezing" towns in place, so that they would have to remain intact. I further specified that county lines must be split a minimum of times. As always, Senate Districts 3, 4, and 6, and the associated Assembly Districts are frozen in place due to concerns about the Voting Rights Act. If anything, under this set of constraints, the map is even less favorable for Democrats than under the previous analyses. This is certainly true in the Senate. Because these simulations ran slowly, I reduced the number of simulations produced to 10,000.

5.4.1 Senate Analysis

Once again, the simulations never result in a situation where Democratic candidates carry the 17 districts needed for a majority.

Figure 28: Number of Simulated Senate Districts won, counties and towns constraint



(a) Using Biden 2020

(b) Using 2016-2022 Index

The mean-median gaps also tend to be a fair distance from zero.

Figure 29: Distribution of Mean-Median scores for simulated Senate districts, using Biden 2020 data, counties and towns constraint

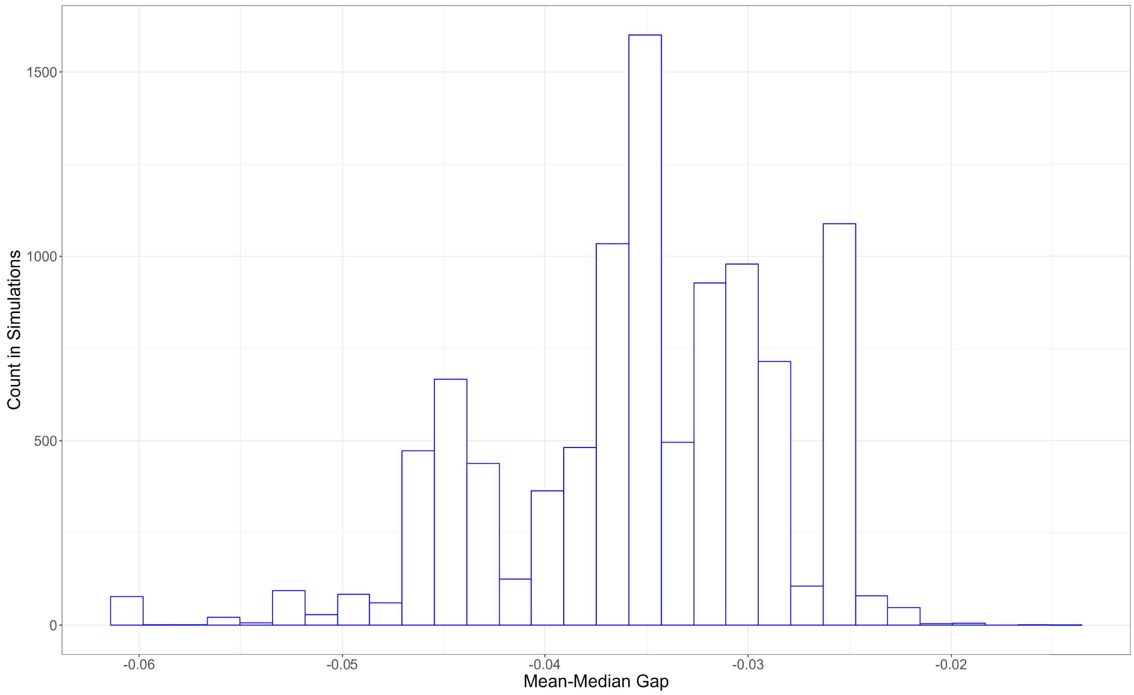
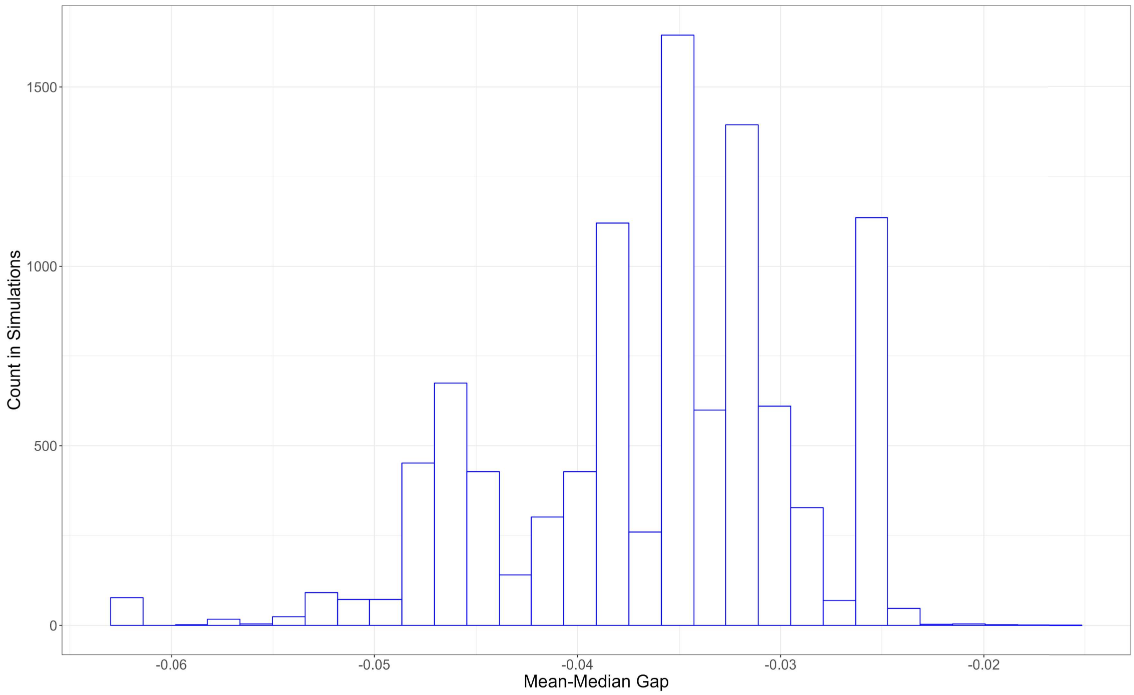


Figure 30: Distribution of Mean-Median scores for simulated Senate districts, using statewide Democrats' 2016 - 2022 data, counties and towns constraint



The same is true when we look at the ranges of partisan scoring we would expect from districts.

Figure 31: Distribution of vote share in simulated Senate districts using Biden 2020 data, counties and towns constraint

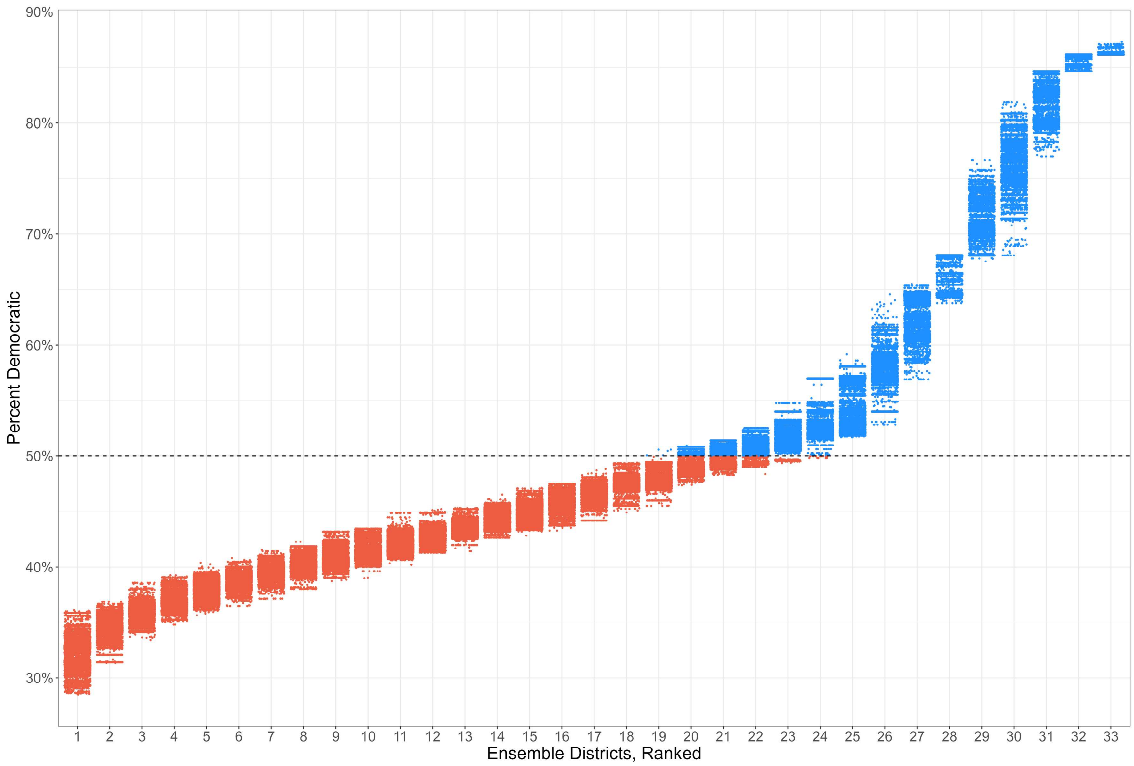
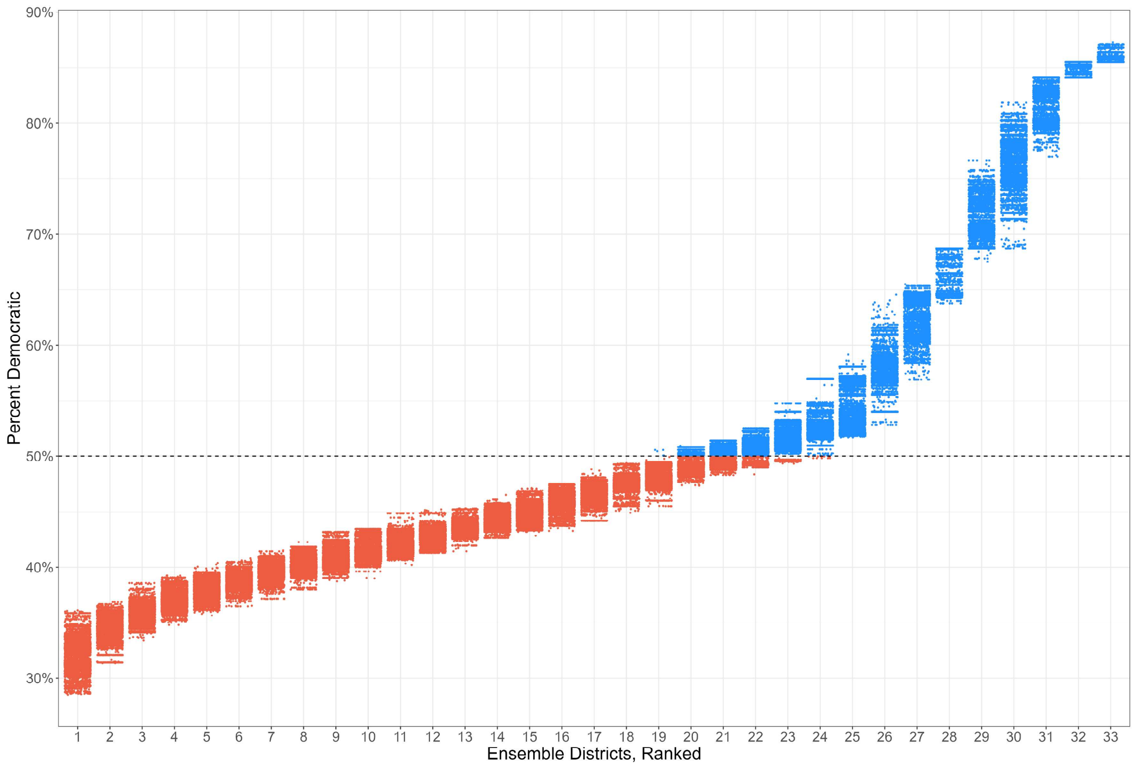


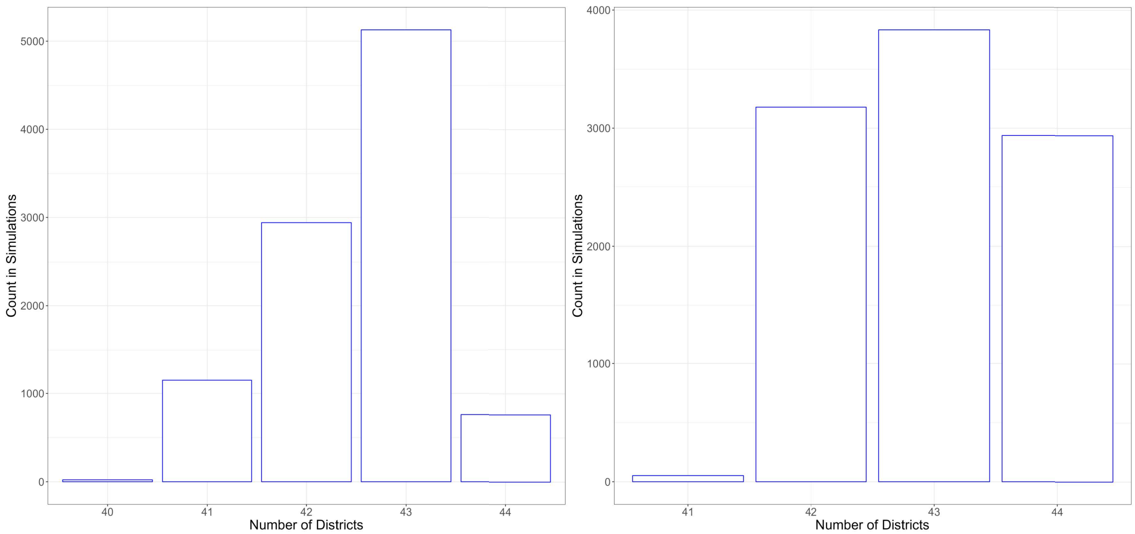
Figure 32: Distribution of vote share in simulated Senate districts using statewide Democrats' 2016 - 2022 data, counties and towns constraint



5.4.2 Assembly Analysis

Under these stronger assumptions, Assembly Democrats' fortunes do not improve

Figure 33: Number of Simulated Assembly Districts won, counties and towns constraint



(a) Using Biden 2020 (b) Using 2016-2022 Index

The mean-median Assembly scores do not cluster around zero.

Figure 34: Distribution of Mean-Median scores for simulated Assembly districts, using Biden 2020 data, counties and towns constraint

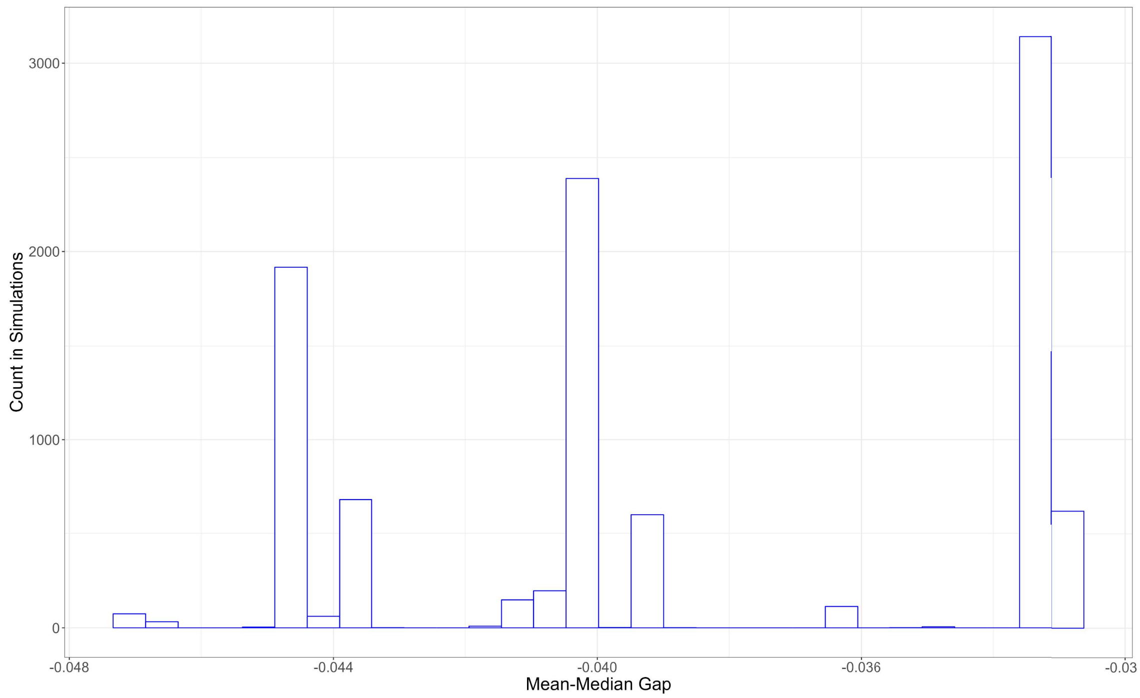
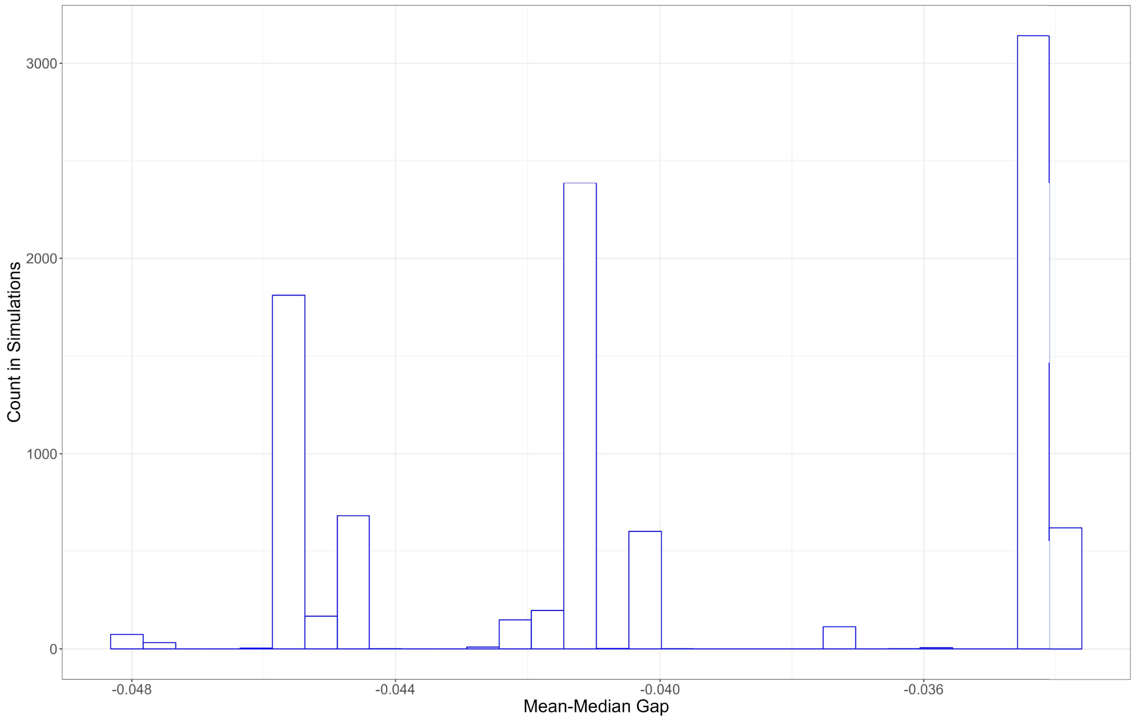


Figure 35: Distribution of Mean-Median scores for simulated Assembly districts, using statewide Democrats' 2016 - 2022 data, counties and towns constraint



The ranges of district partisanship in the simulations are likewise unfavorable to Democrats.

Figure 36: Distribution of vote share in simulated Assembly districts using Biden 2020 data, counties and towns constraint

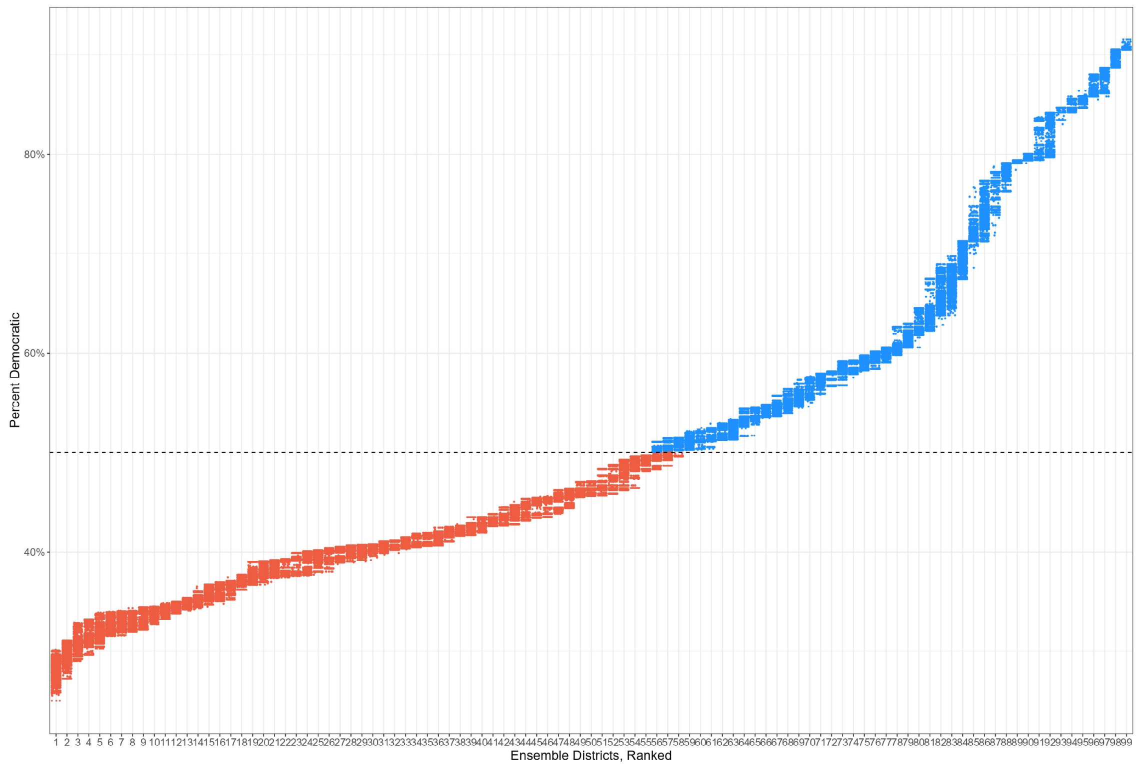
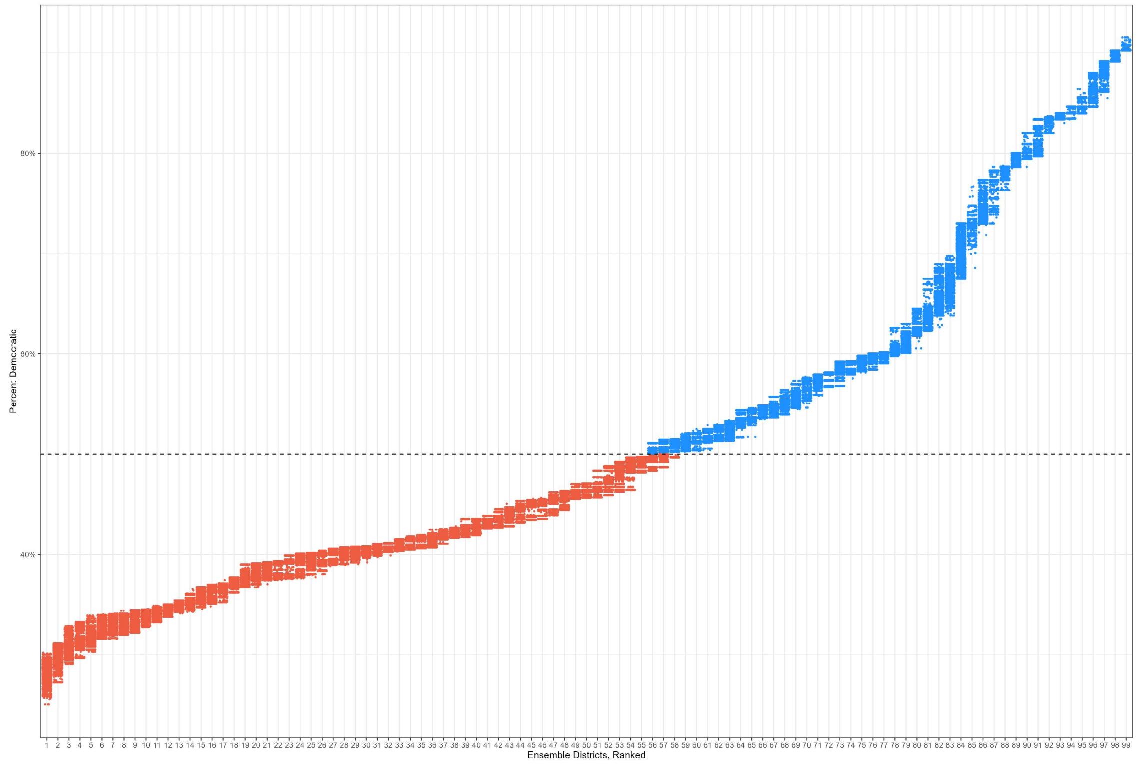


Figure 37: Distribution of vote share in simulated Assembly districts using statewide Democrats' 2016 - 2022 data, counties and towns constraint



.

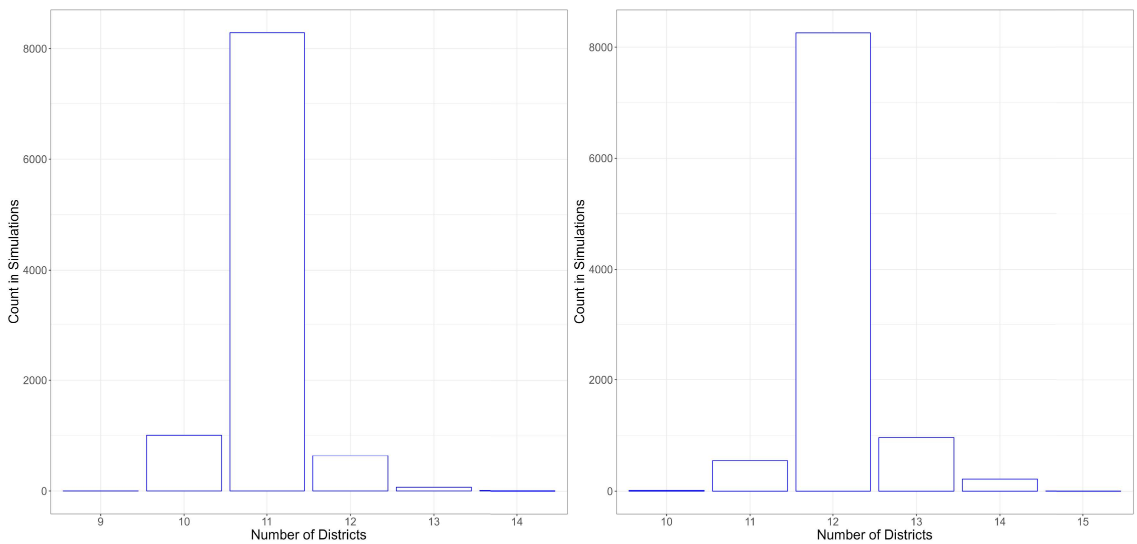
5.5 Simulations with counties and all places intact, with nested assembly districts

Finally, I ran the simulations under conditions as close to those under which a mapdrawer would work as I could. The simulations were forced to respect county lines, while for senate seats, cities, towns, and places were frozen together. There were two cities that are too large to support a single Senate district and therefore must be split: Milwaukee and Madison. In those cities, wards were kept intact, except for instances in Madison where wards were not contiguous. Due to time constraints, I again reduced the number of simulations run to 10,000, and allowed population to deviate by up to two percent. Again, this adjustment would not substantially alter the lean of districts if the population were "zeroed out." After the Senate simulations ran, I randomly selected Senate maps from the ensemble, and simulated Assembly districts within those district boundaries, for a total of 5,000 nested Assembly districts.

5.5.1 Senate Analysis

Once again, we can see that the districts tend to have a Republican lean, and it is difficult to end up with maps where Democrats win a majority of the districts.

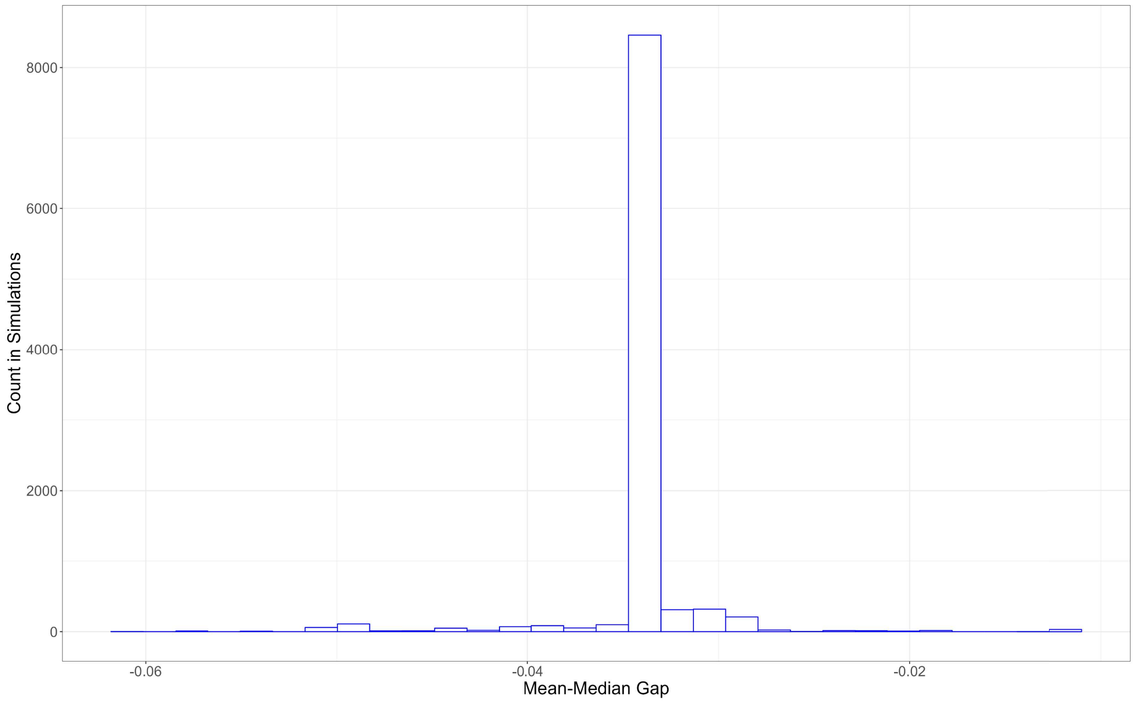
Figure 38: Number of Simulated Senate Districts won, all locales frozen



(a) Using Biden 2020 (b) Using 2016-2022 Index

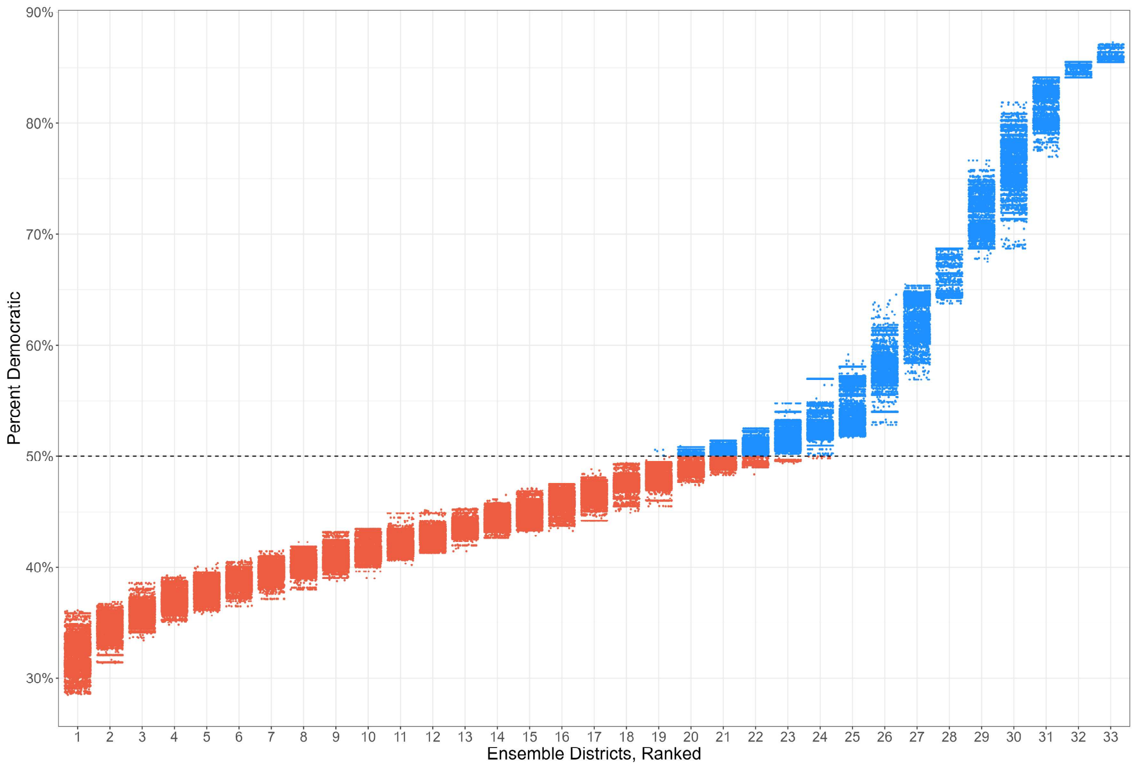
The mean-median gaps from the simulated maps are likewise non-zero.

Figure 39: Distribution of Mean-Median scores for simulated Senate districts, using statewide Democrats' 2016 - 2022 data, all locales frozen



Finally, the ranges of partisan scoring we would expect from districts are unfavorable for Democrats.

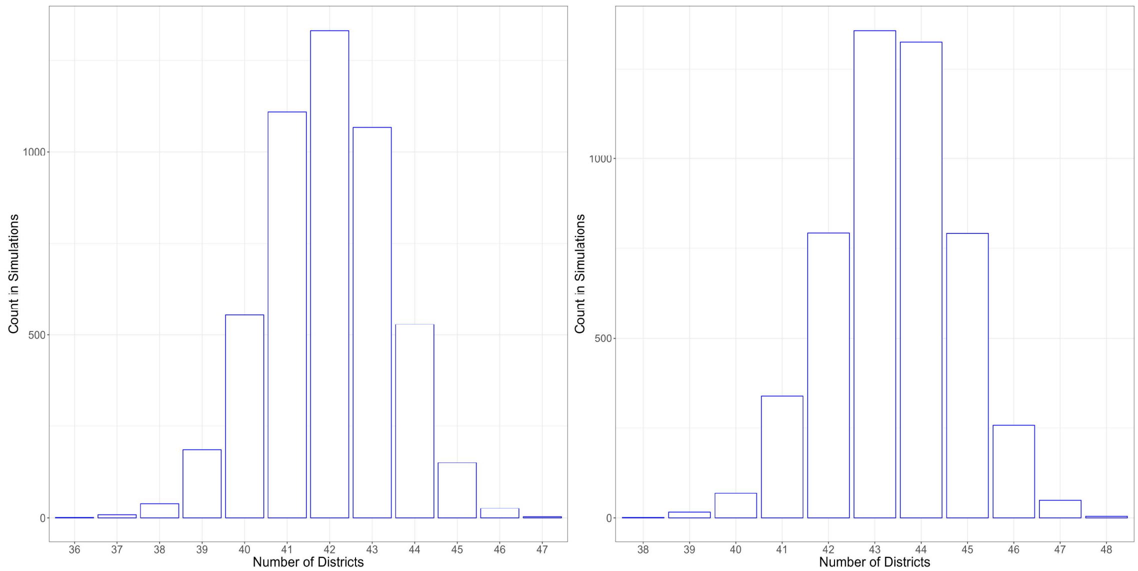
Figure 40: Distribution of vote share in simulated Senate districts using statewide Democrats' 2016 - 2022 data, all locales frozen



5.5.2 Assembly Analysis

The results here are similar to analysis under other constraints.

Figure 41: Number of Simulated Assembly Districts won, all locales frozen



(a) Using Biden 2020 (b) Using 2016-2022 Index

Figure 42: Distribution of Mean-Median scores for simulated Assembly districts, using Biden 2020 data, all locales frozen

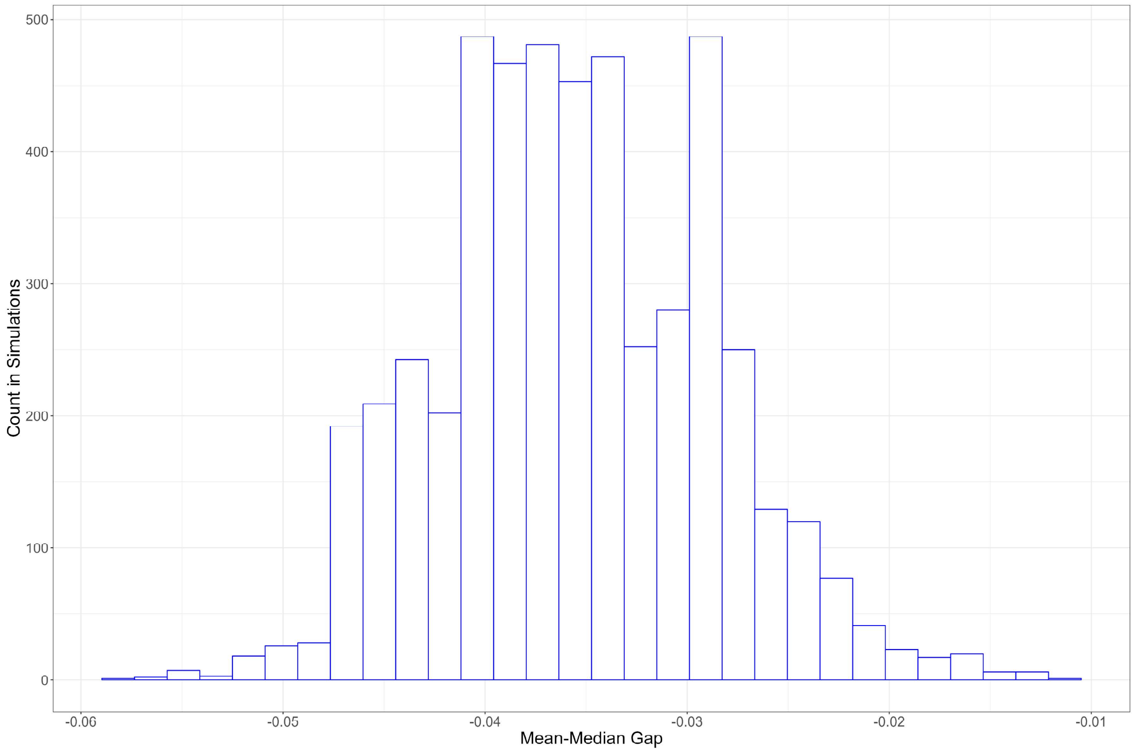


Figure 43: Distribution of Mean-Median scores for simulated Assembly districts, using statewide Democrats' 2016 - 2022 data, all locales frozen

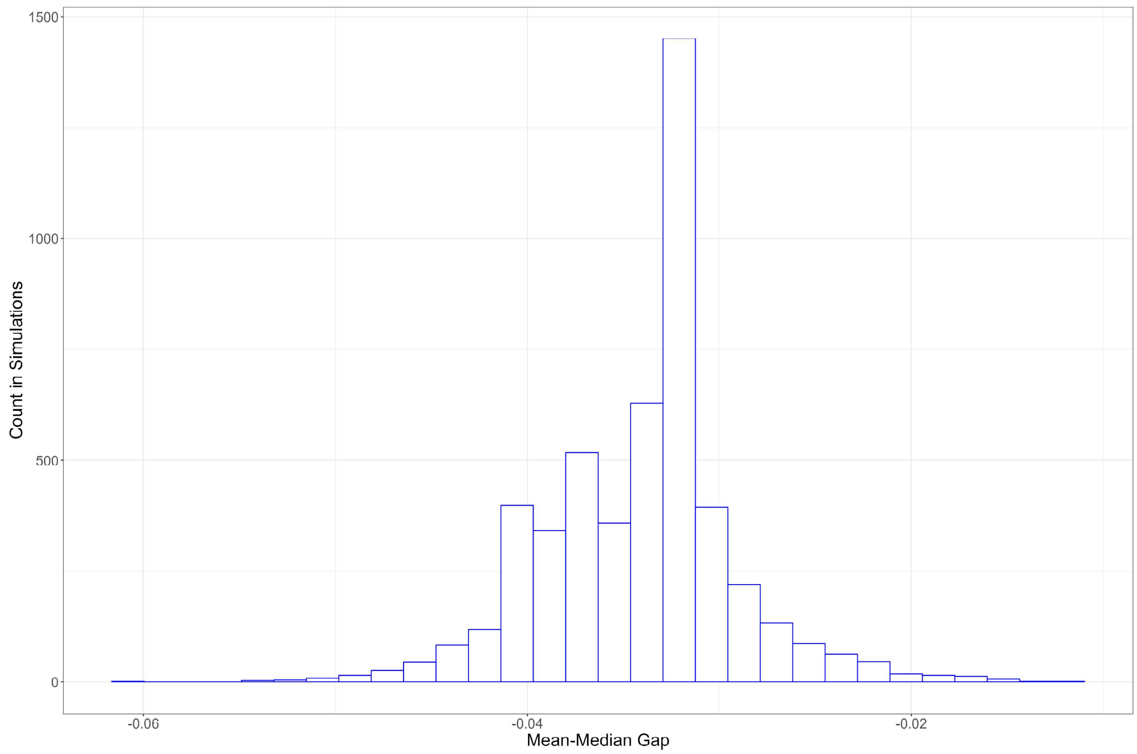


Figure 44: Distribution of vote share in simulated Assembly districts using Biden 2020 data, all locales frozen

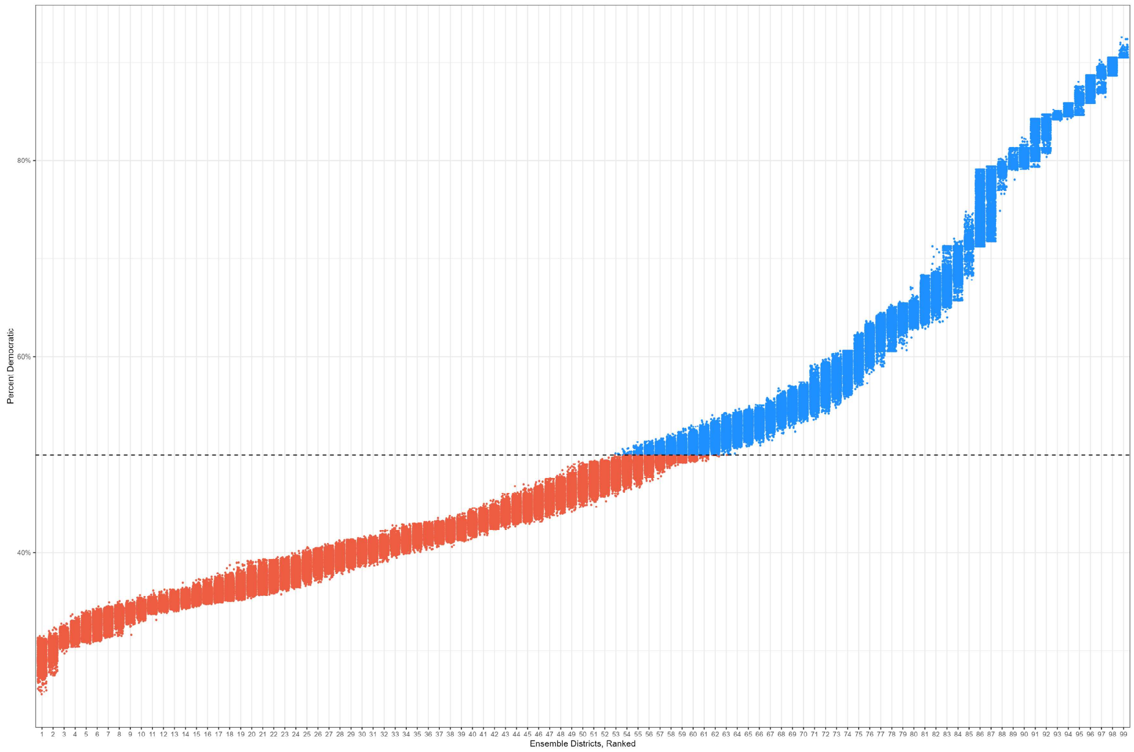
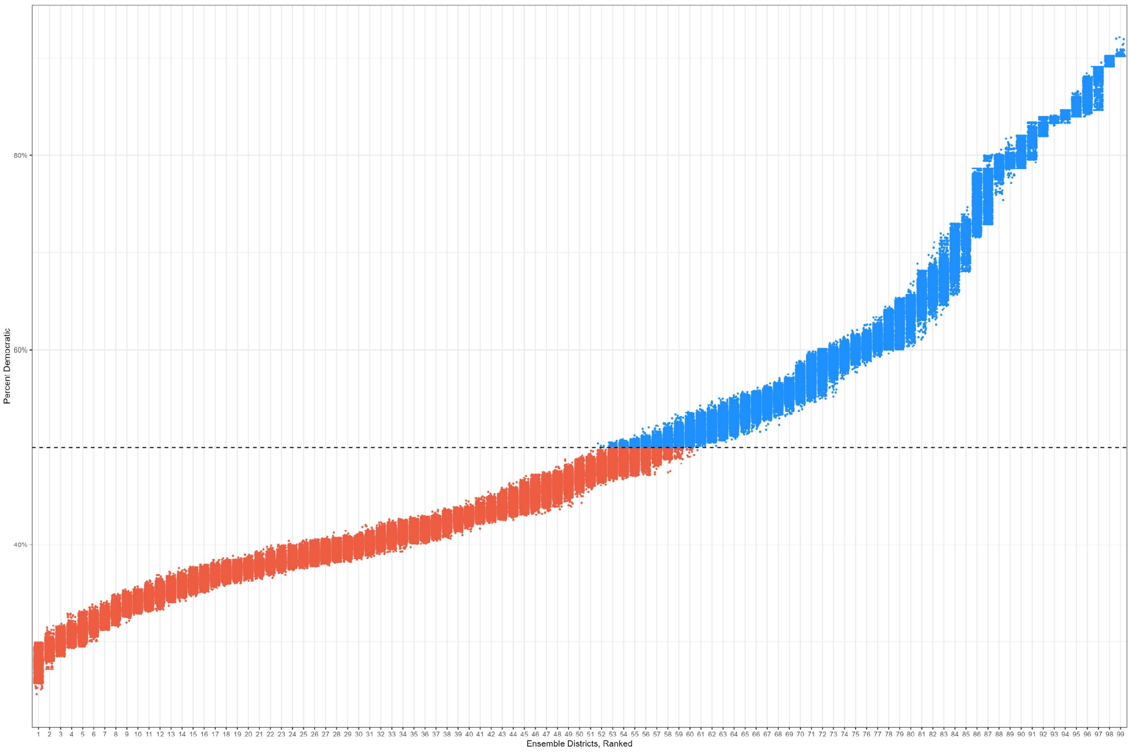


Figure 45: Distribution of vote share in simulated Assembly districts using statewide Democrats' 2016 - 2022 data, all locales frozen



6 Conclusion

Wisconsin's political geography is naturally favorable to Republicans, as multiple simulation techniques demonstrate. Regardless of the degree of constraint placed upon the simulation, the resulting maps have a Republican tilt. In other words, drawing maps without respect to politics will not produce maps that lack any partisan skew. In some cases, trying to draw a map with zero partisan skew would force the mapmaker to work mightily against the state's underlying partisan features.

I declare under penalty of perjury under the laws of the State of Ohio that the foregoing is true and correct to the best of my knowledge and belief. Executed on 12 January 2024 in Delaware, Ohio.

\ s \ Sean P. Trende

Sean P. Trende

Exhibit 1

SEAN P. TRENDE
1146 Elderberry Loop
Delaware, OH 43015
strende@realclearpolitics.com

EDUCATION

Ph.D., The Ohio State University, Political Science, 2023. Dissertation titled *Application of Spatial Analysis to Contemporary Problems in Political Science*, September 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, 2010-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/OR 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.) (state constitutional compliance).

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

Faatz, et al. v. Ashcroft, et al., (Cir. Ct. Mo.) (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).

Robinson v. Ardoin, NO. 22-211-SDD-SDJ (M.D. La.) (VRA).

Republican Party v. Oliver, No. D-506-CV-2022-00041 (N.M. Cir. Ct. (Lea County)) (political gerrymandering).

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, Springs 2020, 2021, 2022, 2023.

Survey Methodology, Fall 2022, Spring 2024.

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/`

CERTIFICATION REGARDING APPENDIX

I certify that the appendix meets the form requirements governing a respondent's appendix contained in Wis. Stat. §809.18(3)(b) and further certify that if the record is required by law to be confidential, the portions of the record included in the appendix are reproduced using one or more initials or other appropriate pseudonym or designation instead of full names of persons, specifically including juveniles and parents of juveniles, with a notation that the portions of the record have been so reproduced to preserve confidentiality and with appropriate references to the record.

Dated this 12th day of January, 2024.

Respectfully submitted,

Electronically Signed by
Kevin M. St. John

BELL GIFTOS ST. JOHN LLC
KEVIN M. ST. JOHN, SBN 1054815
5325 Wall Street, Suite 2200
Madison, WI 53718
608.216.7995
kstjohn@bellgiftos.com