EXHIBIT C

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF GEORGIA ATLANTA DIVISION

GEORGIA STATE CONFERENCE OF THE NAACP, et al. *Plaintiffs*, v. STATE OF GEORGIA, et al. *Defendants.*	Case No. 1:21-CV-5338-ELB-SCJ-SDG
COMMON CAUSE, et al., *Plaintiffs*, v. BRAD RAFFENSPERGER *Defendant*.	Case No. 1:22-CV-00090-ELB-SCJ-SDG

Served on behalf of the Georgia State Conf. of the NAACP Plaintiffs

Expert Report of Dr. Benjamin Schneer

Racially Polarized Voting Analysis: Georgia

Benjamin Schneer

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Introduction

1. My name is Benjamin Schneer and I am an Assistant Professor of Public Policy at the Harvard Kennedy School. I joined Harvard's faculty in 2018, after working for two years as an Assistant Professor of Political Science at Florida State University. In 2016 I completed my Ph.D in Political Science in the Department of Government at Harvard University, where my dissertation won the Richard J. Hernstein Prize. At the Harvard Kennedy School, I teach a course on Empirical Methods and a course on Data Science for Politics.

2. My research is focused on American politics, particularly elections, political representation, and redistricting. I have published research articles in several leading peer-reviewed academic journals including *Science*, *American Journal of Political Science*, *Journal of Politics*, *Quarterly Journal of Political Science*, *Political Behavior*, *Studies in American Political Development*, and *Legislative Studies Quarterly*. My work received the annual Best Paper Award from the *American Journal of Political Science* in 2018, and other research of mine has received media coverage in outlets including *The New York Times*, *The Washington Post*, *The Los Angeles Times*, and *The Economist*.

3. I have worked as a consultant on several matters related to voting rights and redistricting. I co-authored, along with Professor Gary King, the analyses of the Arizona Independent Redistricing Commission Congressional and Legislative District maps submitted on behalf of the commission to the Department of Justice in 2012 – resulting in maps that were pre-cleared on the first attempt

for the first time in Arizona's history. I also have worked as a consultant on the Racially Polarized Voting Analysis prepared for the Virginia Redistricting Commission in 2021.

4. I have been retained to analyze the extent of legally significant racially polarized voting in Georgia's congressional, State Senate and State House district maps passed by the General Assembly in the 2021 redistricting cycle. In this report, I estimate voting behavior in these districts, examine the extent of racially polarized voting, and make an assessment of the performance of these districts in terms of the ability of minority groups to elect their candidates of choice. Then, I consider new illustrative districts proposed by the plaintiffs, again examining the extent of racially polarized voting and the ability of minority groups to elect their candidates of choice in the illustrative districts.

Executive Summary

5. Based on my analysis, I find that there is evidence of racially polarized voting in Georgia overall as well as for specific congressional districts (CDs), state Senate districts (SDs), and state House districts (LDs). Black and Hispanic voters tend to vote cohesively and White voters tend to oppose them. I have primarily analyzed racially polarized voting between Black and White voters; in a handful of districts identified by the plaintiffs, I have analyzed racially polarized voting between Black and Hispanic voters on the one hand and White voters on the other hand.

6. Based on my analysis, I view the voter behavior that I have examined

in the state of Georgia to be consistent with racially polarized voting between minority and majority racial groups in (1) all enacted CDs other than CD 5, (2) in all Illustrative Map CDs other than CD 4, (3) in enacted SDs 6, 9, 16, 17, 22, 23, 25, 26, 28, 34, 35, 38, 40, 43, 44, and 55, (4) in all Illustrative Map SDs I analyze (with the possible exception of Illustrative Map 1 SD 40, which is borderline), (5) in enacted LDs 61, 65, 74, 78, 115, 116, 117, 142, 143, 151, 154, 161, 163, 165 and 171, (6) and in all Illustrative Map LDs I analyze.

7. In terms of minority groups' ability to elect their candidates of choice in the enacted congressional, state Senate and state House districts that I examine, revised maps could clearly result in greater minority representation. Furthermore, some districts with meaningful minority population levels nonetheless offer minority groups a limited ability to elect their candidates of choice based on past elections.

8. The Illustrative Maps drawn by the plaintiffs' map-drawing expert Moon Duchin offer an increased ability to elect the minority-preferred candidates in the districts I have been asked to examine. When looking across statewide elections since 2012 where minority candidates ran against non-minority candidates, in the Illustrative Congressional District Map minority candidates won these elections more than half the time in 6 of the 14 districts (43%); this contrasts with the enacted Congressional District Map, where minority candidates won more than half the time in such elections in 5 of the 14 districts (36%). In the Illustrative State Senate Maps, minority candidates won more than half the time in such elections in 5 of the 5 districts that I examined in Illustrative

Map 1 (100%) and in 2 of the 2 districts that I examined in Illustrative Map 2 (100%). This performance contrasts with the enacted Senate Districts I have examined, where minority candidates won more than half the time in 67% of districts. The Illustrative Maps for the State House outperform the enacted map in terms of ability to elect minority candidates as well.

Methodological Approach

Identifying Racially Polarized Voting

9. Racially polarized voting (RPV) occurs when the majority group and a minority racial group vote differently. To identify instances of RPV in Georgia, I examine (1) whether members of a minority group of interest appear to be *cohesive* in their electoral support for a candidate of choice (Specifically, does more than half of a given minority group support the same candidate?); and, (2) whether White voters oppose this candidate (Specifically, do more than half of White voters oppose the minority candidate of choice?).[1]

10. To make these determinations, I analyze historical voting behavior from Georgia elections since 2012. The Georgia Secretary of State tracks turnout data by racial group in each precinct, along with aggregate vote totals for each candidate in each precinct. While elections from 2012 to 2021 were conducted

[1]For a detailed discussion of cohesion, see Bernard Grofman, Lisa Handley, and Richard G. Niemi, Minority representation and the quest for voting equality, Cambridge University Press, 1992. The authors note that courts have concluded that cohesiveness "is to be measured with reference to voting patterns" (p. 68), and that "minority groups are politically cohesive if they vote together for minority candidates" (p. 73).

under the previous district maps, I focus primarily on elections for which changes in district lines are unlikely to affect vote choice. Specifically, I use historical national and state-wide elections to evaluate congressional, state House and state Senate districts. I discuss in more detail the specific elections I have selected to study, and the rationale for my choices, in the next section.

11. Because elections are conducted under a secret ballot, it is not possible to tally vote choice directly for each racial group in order to assess voter behavior in each enacted district. Instead, I estimate racial-group-level vote totals based on the precinct-level election data, producing estimates for each racial group's vote share in support of each candidate.[2]

12. To do this, I employ a standard approach in the political science literature and in redistricting litigation when one must estimate the voting behavior of specific racial groups based on aggregate vote totals: ecological inference (EI).[3] Ecological inference makes use of (1) the statistical information captured by how strongly a candidate's level of support varies in tandem with variation in each racial group's population share across precincts, and (2) deterministic information captured in precincts that consist primarily of one racial group. For example, if a precinct is relatively homogeneous, one can place bounds on the range of possible voting behaviors for a racial group in that precinct, with the

[2]On the value of both statewide elections and precinct-level data, see Gary King, A Solution to the Ecological Inference Problem: Reconstructing Individual Behavior from Aggregate Data, Princeton University Press, 1997. King writes: "For electoral applications, choosing data in which all geographic units have the same candidates (such as precincts from the same district or counties form the same statewide election) is advisable so that election effects are controlled" (p. 28).

[3]King, 1997.

most extreme version of this occurring when a precinct is entirely homogeneous.[4] The key advantage of EI is that it combines both the statistical and deterministic information I have just described. Technical summaries of the EI approach can be found in a variety of sources, including King, Rosen and Tanner (2004).[5] In this report, I use the RxC method of ecological inference, allowing me to identify voting patterns across all the primary racial groups in Georgia at once. This approach is based upon the hierarchical model described in Rosen, Jiang, King and Tanner (2001),[6] and the draws from this model's posterior distribution are obtained using a Metropolis-within-Gibbs sampling algorithm.[7] Previous research comparing approaches including ecological regression, 2x2 ecological inference and the Rosen et al. (2001) method has found that these approaches tend to yield similar results, with Rosen et al. (2001) having a slight edge in instances with more than two racial groups.[8] Additionally, a variety of published research and legal cases have made use of this method.[9]

[4]Otis Dudley Duncan and Beverly Davis, "An alternative to ecological correlation," *American Sociological Review* (1953).

[5]Gary King, Ori Rosen, and Martin A. Tanner, "Information in ecological inference: An introduction," In *Ecological Inference: New Methodological Strategies*, pp. 1-12, Cambridge University Press, 2004.

[6]Ori Rosen, Wenxin Jiang, Gary King, and Martin A. Tanner, "Bayesian and frequentist inference for ecological inference: The R× C case," *Statistica Neerlandica* 55, no. 2 (2001): 134-156.

[7]Olivia Lau, Ryan T. Moore, and Michael Kellermann, "eiPack: R× C ecological inference and higher-dimension data management," *New Functions for Multivariate Analysis* 7, no. 1 (2007): 43, Available at https://cran.r-project.org/web/packages/eiPack/index.html.

[8]Justin de Benedictis-Kessner, "Evidence in voting rights act litigation: Producing accurate estimates of racial voting patterns," *Election Law Journal* 14, no. 4 (2015): 361-381.

[9]Research articles making use of this approach include: Michael C. Herron and Jasjeet S. Sekhon, "Black candidates and black voters: Assessing the impact of candidate race on uncounted vote rates," *The Journal of Politics* 67, no. 1 (2005): 154-177. Matt Barreto, Loren Collingwood, Sergio Garcia-Rios, and Kassra AR Oskooii. "Estimating candidate support in Voting Rights Act cases: Comparing iterative EI and EI-R×C methods." *Sociological Methods & Research* 51, no. 1 (2022): 271-304. Legal cases where experts have presented opinions

Measuring District Performance

13. I also examine the performance of the districts being challenged along with newly proposed districts to assess if they allow minority groups to elect candidates of choice. I again use historical elections re-aggregated to the new districts to make this assessment, and I focus on several related questions: (1) What is the minority share of the electorate in the newly enacted districts? (2) In what share of past elections would the minority candidate of choice have won in these historical elections? (3) Given the results for the previous two questions, does the district as drawn constitute sufficient minority voting strength for minority voters to elect candidates of choice?[10]

Data Sources

14. To perform the analyses in this report, I rely on elections data from the Georgia Secretary of State's office and the Georgia General Assembly's Legislative and Congressional Reapportionment Office. Georgia, unlike many other states, records turnout data by race for all elections. As a result, there is no uncertainty about the turnout of different racial groups in Georgia and ecological inference analysis only needs to be used to determine voter preferences by race.

making use of RxC ecological inference include: *League of Women Voters of Ohio, et al. v. Ohio Redistricting Commission*, *Caster v. Merrill*, *Milligan v. Merrill*, and previous filings in this case among others.

[10]See Grofman, Handley and Niemi, 1992. They write: "What is clearly established by *Gingles* is that white bloc voting is legally significant, regardless of the actual percentages of whites voting against minority-preferred candidates, when it usually results in the defeat of the minority-preferred candidates" (p. 73).

15. The state has produced reapportionment reports that contained precinct-level voter registration and turnout by race[11] along with precinct-level vote totals for all general elections between 2014 and 2020. I also requested the data from the 2012 reapportionment report but the state did not provide it; as a result, I instead used 2012 reapportionment report data that I received directly from the Lawyers' Committee for Civil Rights. For the 2022 election, I received data on turnout from the Secretary of State's office but I did not receive precinct-level election totals. As a result, I again used data received from the Lawyers' Committee for Civil Rights.[12]

16. To analyze the 2018 and 2021 runoff elections, I used data compiled by the Voting and Election Science Team (VEST).[13] These files include precinct-level general election results and turnout data.

Maps

17. To use past election data to understand potential voter behavior in newly-drawn districts, I assign precincts to the enacted congressional and legislative

[11]Georgia includes the following options for voters to select as their race and/or ethnicity: American Indian, Asian/Pacific Islander, Black, Hispanic/Latino, Other, and White. For the purposes of this report, I focus on the behavior of Black, Hispanic/Latino, and White voters and I combine all other categories into the Other category. When analyzing RPV between Black, Hispanic and White voters I estimate vote shares for each of these four categories but only report the Black, Hispanic and White vote shares. When analyzing RPV between Black and White voters only I include Hispanic voters in the Other category.

[12]The precinct-level election results for the 2022 data were downloaded from the Secretary of State's website at https://sos.ga.gov/index.php/elections/federalgeneral_election_runoff_turnout_by_demographics_january_2021 and compiled by the Lawyer's Committee for Civil Rights.

[13]Voting and Election Science Team. "2020 Precinct-Level Election Results", Harvard Dataverse V29, 2020, https://doi.org/10.7910/DVN/K7760H.

district boundaries as well as the illustrative boundaries. In order to accomplish this, I downloaded GIS shape files from the Legislative and Congressional Reapportionment Office page on the Georgia General Assembly website.[14] These included shape files for the passed map of congressional districts, the passed map of state House districts, the passed map of state Senate districts, and precinct shape files for 2012, 2014, 2016, 2018 and 2020. For 2022, I used precinct shape files provided to me by the Lawyers Committee for Civil Rights. For the illustrative maps presented by the plaintiffs, I received data assigning each census block in the state to a district, which I converted into district-level shape files. I then spatially joined precincts for each election year to the enacted and illustrative districts.[15] In practice, the spatial join amounts to finding which precincts are contained within congressional, state Senate and state House districts and then assigning them to the new districts.

Elections

18. I estimate EI models using statewide general elections occurring between 2012 and 2022.[16] These consist of: US Presidential Elections in 2012, 2016

[14] Available at https://www.legis.ga.gov/joint-office/reapportionment.

[15] Specifically, the join is based on a point within the interior of the precinct boundaries and towards the middle of the precinct. I do not use the centroid of the precinct because a centroid can be located outside the boundary of a precinct for non-convex precinct shapes. Split precincts occur rarely; in 2022, for example, 1.18% of precincts in congressional districts, 1.22% of precincts in state Senate districts, and 5.83% of precincts in state House districts were split such that more than 5% of their area was contained in multiple districts.

[16] I omit any elections without a candidate from each of the major political parties as well as the 2020 US Senate special election. This election occurred between multiple candidates of different parties, including Raphael Warnock (D), Kelly Loeffler (R), Doug Collins (R), Deborah Jackson (D) and Matt Lieberman (D). This election is qualitatively different from the others as it presents an expanded choice set of candidates, multiple minority candidates, and no candidate

and 2020; US Senatorial Elections in 2014, 2016, 2020, 2021 (Runoff), and 2022 (General and Runoff); State Gubernatorial Elections in 2014, 2018 and 2022; State Lieutenant Governor Elections in 2014, 2018 and 2022; Secretary of State Elections in 2014, 2018 (General and Runoff) and 2022; State Agriculture Commissioner Elections in 2014, 2018 and 2022, State Attorney General Elections in 2014, 2018 and 2022; State Insurance Commissioner Elections in 2014, 2018 and 2022; State Labor Commissioner Elections in 2014, 2018 and 2022; State Superintendent of Public Instruction Elections in 2014, 2018 and 2022; and, State Public Service Commissioner Elections in 2014, 2018 (General and Runoff), 2020 and 2021 (Runoff).

20. When studying the extent of legally significant racially polarized voting in general elections, I estimate ecological inference results for general elections but not for primaries. Primary elections can be of use in an RPV analysis, but in my view studying them is not necessary or sufficient for drawing conclusions about racially polarized voting in Georgia general elections. For example, if racially polarized voting occurs in a Georgia primary election it does not necessarily imply that racially polarized voting will occur in the general election, and vice versa. The primary electorate is often considerably different than the electorate in a general election. Indeed, political science research has found "consistent support for the argument that primary and general electorates diverge in their policy ideology."[17] Thus, in my judgment, it is sufficient in this case to examine

receiving a majority of votes. Due to these factors, the election poses a less clear test of racially polarized voting, and I do not attempt to draw any conclusions from it at the statewide level or in my subsequent analysis of voting behavior within specific districts.

[17]See Seth J. Hill, "Institution of nomination and the policy ideology of primary electorates,"

behavior in general elections in order to determine the extent of racially polarized voting in Georgia general elections.

21. While I estimate RPV results for all statewide general elections since 2012, I rely on those elections in which a minority candidate was one of the two major party candidates running for office as most probative for making inferences about racially polarized voting.[18] In Georgia between 2012 and 2022, among the statewide elections that I examine, a minority candidate ran against a non-minority candidate in the following instances:

- 2012 Presidential Election, Barack Obama (D)
- 2014 Insurance Commissioner Election, Liz Johnson (D)
- 2014 Labor Commissioner Election, Robbin Shipp (D)
- 2014 Lt. Governor Election, Connie Stokes (D)
- 2014 Secretary of State Election, Doreen Carter (D)
- 2014 Superintendent of Public Instruction, Valarie Wilson (D)
- 2014 Public Service Commissioner 4 Election, Daniel Blackman (D)
- 2018 Gubernatorial Election, Stacey Abrams (D)
- 2018 Insurance Commissioner Election, Janice Laws Robinson (D)
- 2018 Superintendent of Public Instruction Election, Otha Thornton (D)
- 2020 Public Service Commissioner 1 Election, Robert Bryant (D)

Quarterly Journal of Political Science 10, no. 4 (2015), p. 480.

[18]An election between a minority and a non-minority candidate provides variation in the race of the candidate and therefore offers a test of whether race might matter in vote choice among different voter groups. Some past cases have also placed more weight on elections between a minority and non-minority candidate: "Elections between white and minority candidates are the most probative in determining the existence of legally significant white bloc voting." See *Old Person v. Cooney*, 230 F.3d 1113, 112324 (9th Cir. 2000).

- 2020 Public Service Commissioner 4 Election, Daniel Blackman (D)
- 2020 US Senator Special Election, Raphael Warnock (D)
- 2021 Public Service Commissioner 4 Runoff, Daniel Blackman (D)
- 2021 US Senator Special Election Runoff, Raphael Warnock (D)
- 2022 Gubernatorial Election, Stacey Abrams (D)
- 2022 Secretary of State Election, Bee Nguyen (D)
- 2022 Agriculture Commissioner Election, Nakita Hemingway (D)
- 2022 Insurance Commissioner Election, Janice Laws Robinson (D)
- 2022 Labor Commissioner Election, William Boddie (D)
- 2022 Superintendent of Public Instruction Election, Alisha Searcy (D)

22. In addition to these elections, I also include elections in which no minority candidate ran or two minority candidates ran as major party candidates. These are useful for establishing a general pattern of vote choice for different racial groups, even if elections with a single minority candidate are most probative for determining the extent of RPV. In all of my subsequent RPV analysis, I examine the vote shares cast in support of the statewide minority-preferred candidate for a given election. I define the statewide minority-preferred candidate as the candidate who garnered the majority of votes cast by minority voters according to statewide EI estimates.[19]

[19]Note that for any given election it must still be determined whether the statewide minority-preferred candidate is supported cohesively by the minority groups considered in this report. But, whether or not this occurs, by definition there will always be one candidate who received a majority of votes cast by minority voters.

EI Analysis of Enacted Districts

Statewide

23. I begin by analyzing the extent of RPV that has occurred overall in historical statewide elections. At the state level, elections in Georgia exhibit an unambiguous and consistent pattern of racially polarized voting. I make this determination by examining the vote choices of racial groups across past elections.

24. Figure 1 plots the EI estimates for the set of statewide elections under consideration, which were held from 2012 to 2022. The labels on the left side of the plot indicate the specific elections considered. Elections for which one minority candidate ran against a non-minority candidate are indicated with a star. In the plot, the point estimates illustrating the level of support for a candidate are marked with a circle. In this and in all subsequent analyses, these circles represent my estimate of two-party vote share for the minority-preferred candidate (e.g., the votes cast for the preferred major party candidate divided by the sum of the votes cast for the candidates of both major parties) for a given election. The point estimates can be understood in this context as the vote shares that were most likely to have generated the pattern of data (e.g., votes cast for candidates and turnout among different racial groups) that occurred across precincts in a given election. Additionally, the horizontal lines emanating from either side of the circles indicate the bounds of the 95% confidence intervals. The 95% intervals reflect the uncertainty of each estimate; specifically, for the

EI model, they mark the interval for which there is a 95% probability that the true vote share is contained within the lower and upper bounds.[20] In instances where no confidence interval is visible, the intervals are narrow and not visible to the eye (though they still exist).

25. I will explain and interpret these plots in two steps.[21] First, the points clustered on the right side of the plot indicate large majorities of Black and Hispanic voters all supported minority candidates in each election in which they ran between 2012 and 2022 and were opposed by non-minority candidates. In elections without a minority candidate, these voters still acted cohesively to support other minority-preferred candidates.[22]

26. For example, in the 2018 gubernatorial election, I estimate that about 99% of Black voters supported Stacey Abrams, a minority candidate. This overwhelming level of support among Black voters for minority candidates running against non-minority candidates is similar across all other elections as well, including for Barack Obama in 2012 (98%), Connie Stokes in 2014 (98%), Doreen Carter in 2014 (98%), Otha Thornton in 2018 (99%) and Raphael Warnock in 2021 (99%).

[20]See Guido W. Imbens, "Statistical significance, p-values, and the reporting of uncertainty," *Journal of Economic Perspectives* 35, no. 3 (2021): 157-74. Also see Andrew Gelman, John B. Carlin, Hal S. Stern, and Donald B. Rubin, *Bayesian data analysis*, Chapman and Hall/CRC, 1995. Note that this interpretation of a 95% interval is in subtle contrast with a non-Bayesian or frequentist interpretation of the confidence intervals, which is that if this estimation were repeated for numerous iterations of a given election, the calculated 95% confidence intervals would contain the true value of a racial group's vote share 95% of the time.

[21]I have included with this report a digital Supplementary Appendix file recording individual estimates and confidence intervals for each election studied in a plot.

[22]Table 10 in the Appendix reports the full list of statewide minority-preferred candidates based on my estimates.

27. I estimate that about 96% of Hispanic voters supported Abrams in 2018. Again, the results are generally similar across other elections I examined with minority candidates. When a minority candidate was not one of the two major party candidates, minority voters continued to vote cohesively, supporting particular candidates at overwhelming rates. Overall, then, I conclude that Black and Hispanic voters' past behavior in statewide elections reveals that these groups had a clear *candidate of choice* in each election, with large majorities of these voters supporting the same candidate in each election and voting cohesively. And, in particular, when a minority candidate ran against a non-minority candidate in a general election, a clear majority of each racial minority group voted for the minority candidate.

28. Second, I study voting patterns of White voters. As an example, I estimate that in 2018 15% of White voters supported Abrams. Similarly, across all historical statewide elections between 2012 and 2022, considerably less than half of White voters supported minority candidates (when running against non-minority candidates). A majority of White voters voted against the candidate of choice of minority voters. With this information in mind, my assessment is that these historical elections exhibit clear evidence of racially polarized voting at the statewide level. Hispanic and Black voters cohere around the same candidates of choice, and White voters oppose them, consistent with RPV. Thus, any new districts proposed as a remedy would be drawing from a state where there is evidence of racially polarized voting affecting the minority groups considered in this report.

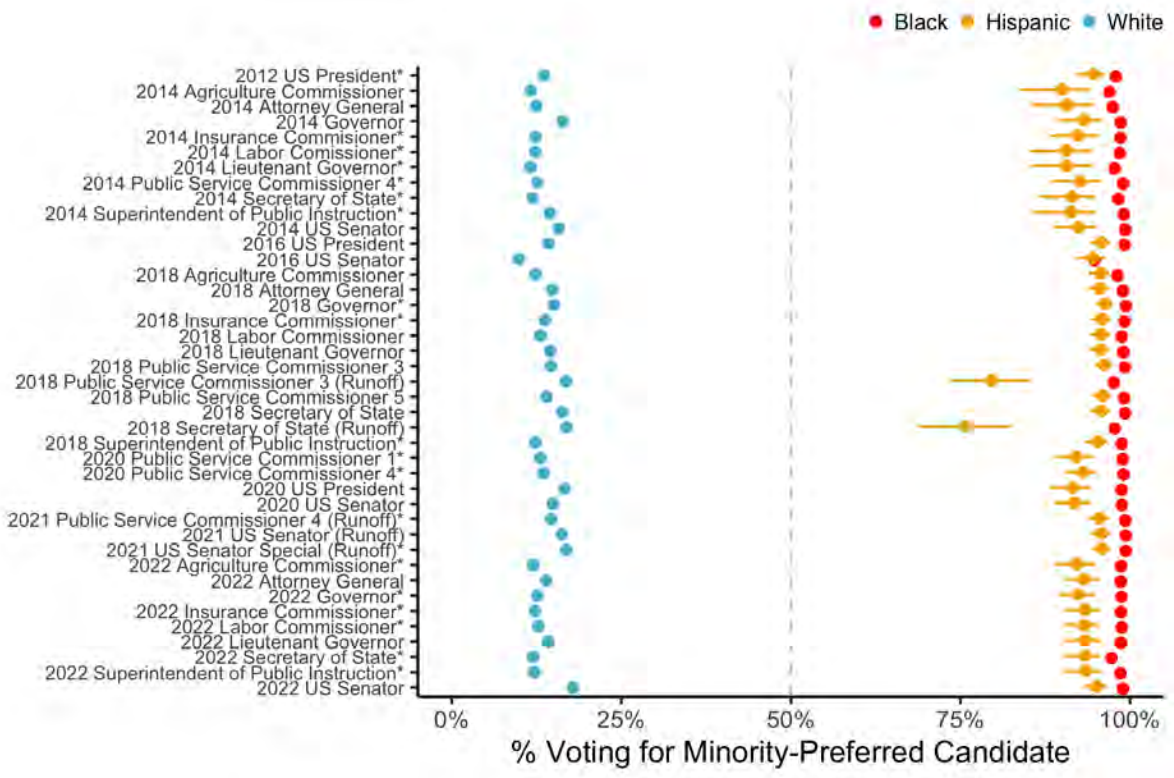

Figure 1: Ecological Inference Results — Statewide (Historical Elections, Two-Party Vote Shares), 3 Racial Groups

Congressional Districts

29. I have been asked to examine RPV between Black and White voters in all enacted congressional districts in the state. Figure 2 illustrates the boundaries of the state's congressional districts.

30. Table 1 records the share of the electorate comprised by each racial group in each congressional district. These estimates are based on averaging across the 2020 and 2022 turnout figures. Minority groups constitute a majority of the electorate in CDs 4, 5, 7 and 13 based on the turnout numbers from 2020 and 2022.

31. Figures 3 through 7 present the EI results for individual congressional districts. As before, the point estimate for a racial group's vote share in a given election is represented with a dot and the uncertainty in the estimate is reflected in the 95% confidence intervals that emanate from the point estimate.

32. For most districts, the analysis of RPV between White and Black voters is very straightforward. In CDs 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13 and 14, Black voters supported, by an overwhelming margin, the minority candidate in all historical elections in which they ran. When a minority candidate did not run or when multiple minority candidates ran, Black voters supported the statewide minority-preferred candidates in these districts: the confidence intervals never overlap with the threshold for majority support (e.g., 50%). White voters opposed the candidate of choice of Black voters in every historical election. Again, the confidence intervals on the estimates for White voters never

overlap with the the threshold for majority support.

33. For example, CD 3 demonstrates clear evidence of RPV between White and Black voters for all elections that I examine. For Black voters, I never estimate a minority-preferred candidate vote share below 92.8%. For White voters, I never estimate a minority-preferred candidate vote share above 12.2%.

34. As another example, CD 7 presents another strong example among the congressional districts of RPV, with Black voters cohering around minority candidates (and other minority-preferred candidates) and with White voters opposing these candidates of choice. In every election with a minority candidate running against a non-minority candidate, minority voters supported the minority candidate, often overwhelmingly. For example, in the 2018 Gubernatorial race, I estimate that 97% of Black voters supported Abrams. In contrast, 19% of White voters in the district supported Abrams according to my estimates. None of the confidence intervals overlapped with the threshold for majority support in this election. The same pattern generally holds in earlier election years where minority candidates ran. In my view, this pattern constitutes clear evidence of RPV.

35. CD 4 exhibits evidence of RPV between White and Black voters as well. In more recent elections a majority of White voters occasionally voted along with minority racial groups; however, this did not occur for any elections in which a minority candidate ran against a non-minority candidate. Two of the four instances where this occurred were lower salience elections, such as the 2018 Runoffs for Secretary of State and for Public Service Commissioner.

Overall, CD 4 suggests to me cohesive behavior across Black voters in support of minority candidates (and other minority-preferred candidates). White voters have reliably opposed the minority candidates of choice.

36. Unlike all other congressional districts in the state, CD 5 does not exhibit evidence of racially polarized voting. White voters in the district tended across a majority of elections to support the same candidate as minority voters. Based on my analysis, Black voters supported minority candidates in all historical elections, but White voters opposed this candidate of choice in only 15% of these elections.

37. To sum up, I observe RPV between Black voters on the one hand and White voters on the other hand when pooling across all CDs (e.g., statewide) as well as specifically for all CDs other than CD 5. In each of these congressional districts, when I focus specifically on elections with one minority candidate, Black voters supported that candidate and were opposed by White voters every time since 2012.

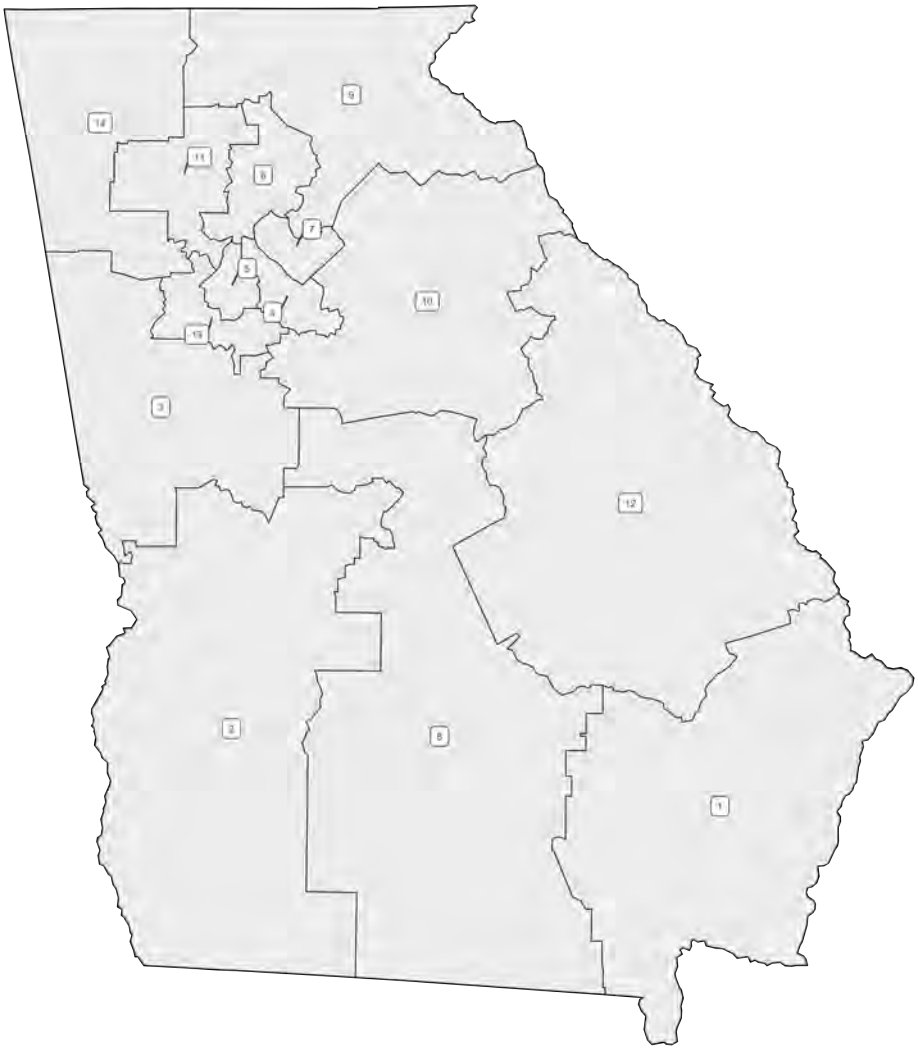

Figure 2: Map of Enacted Congressional Districts

Table 1: Percentage of Electorate by Race, Average of 2020 and 2022 Elections, Enacted CDs

CD	Black	Hispanic	White	Other
1	23.9%	1.8%	64.8%	9.5%
2	40.7%	1.1%	51.9%	6.3%
3	21.0%	1.8%	67.5%	9.7%
4	48.8%	2.3%	35.9%	12.9%
5	39.3%	2.3%	44.1%	14.2%
6	7.2%	3.3%	70.2%	19.2%
7	28.3%	6.5%	43.6%	21.5%
8	24.5%	1.2%	68.5%	5.7%
9	9.1%	4.0%	75.2%	11.7%
10	18.2%	2.1%	70.3%	9.3%
11	14.0%	3.6%	71.1%	11.2%
12	30.0%	1.4%	60.4%	8.2%
13	63.6%	2.8%	20.9%	12.7%
14	13.5%	3.1%	74.8%	8.6%

Note: This table reports the share of the electorate, based on the average across 2020 and 2022 turnout, of each racial group in a given congressional district.

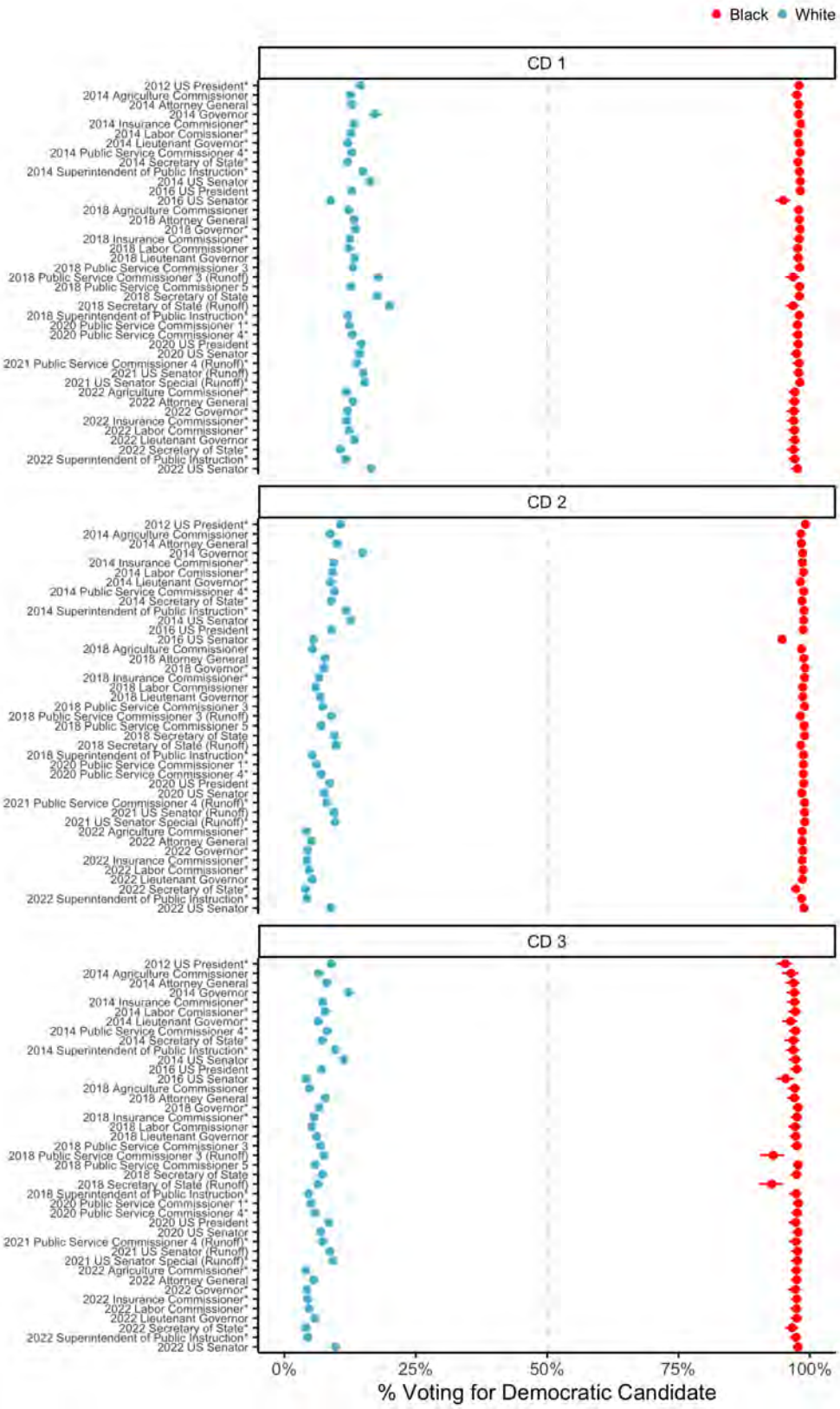

Figure 3: Ecological Inference Results — Enacted Congressional Districts (Historical Elections, Two-Party Vote Shares)

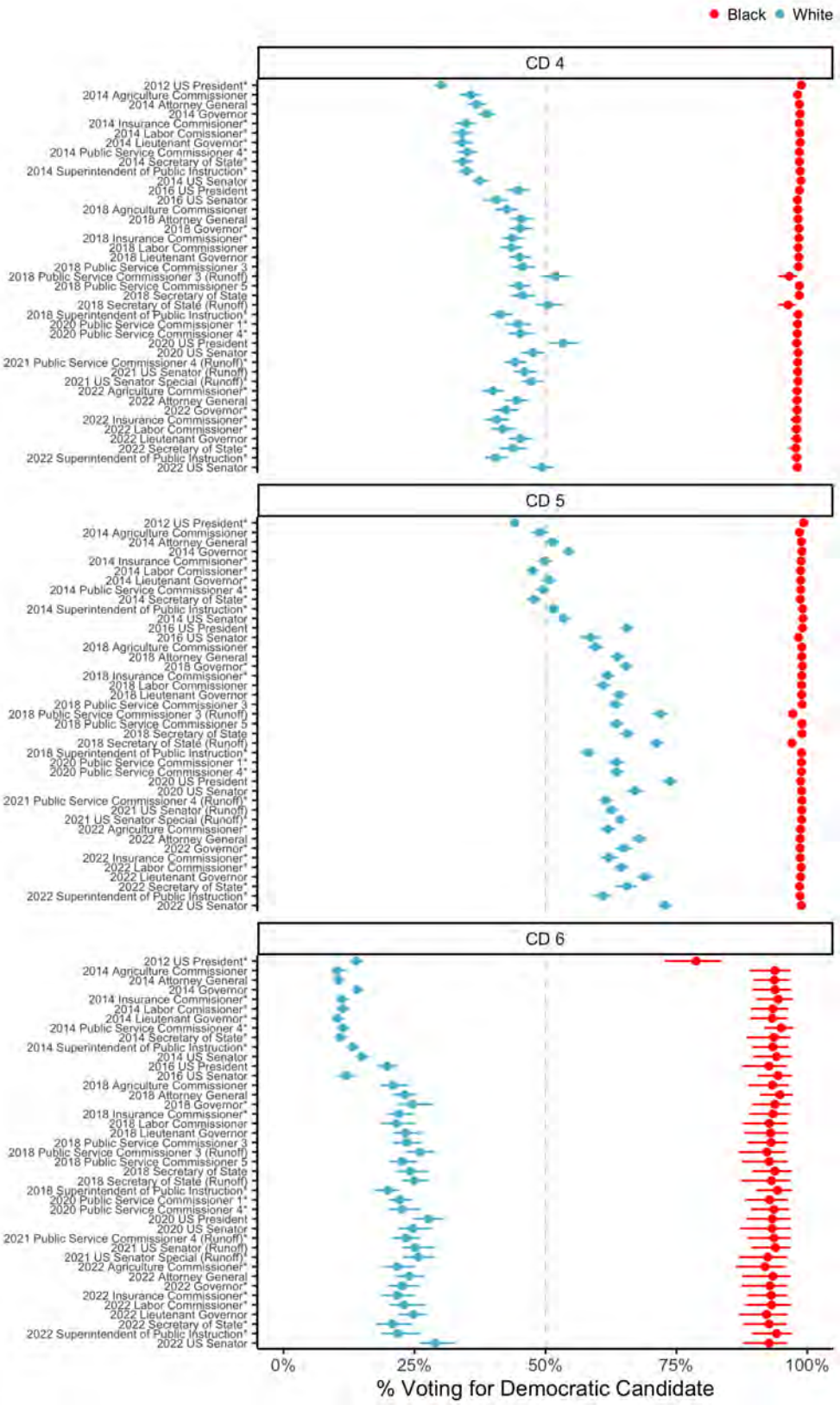

Figure 4: Ecological Inference Results — Enacted Congressional Districts (Historical Elections, Two-Party Vote Shares)

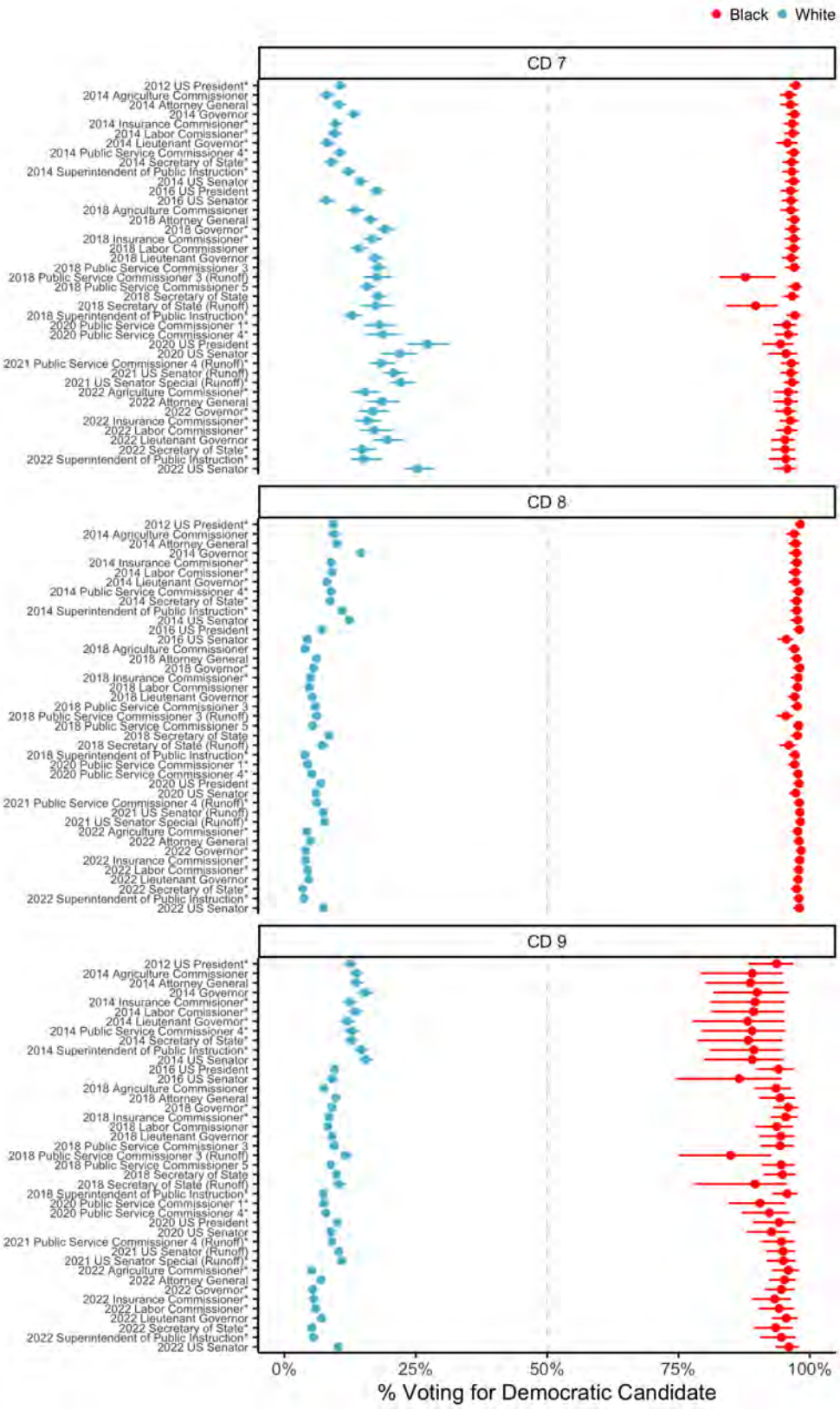

Figure 5: Ecological Inference Results — Enacted Congressional Districts (Historical Elections, Two-Party Vote Shares)

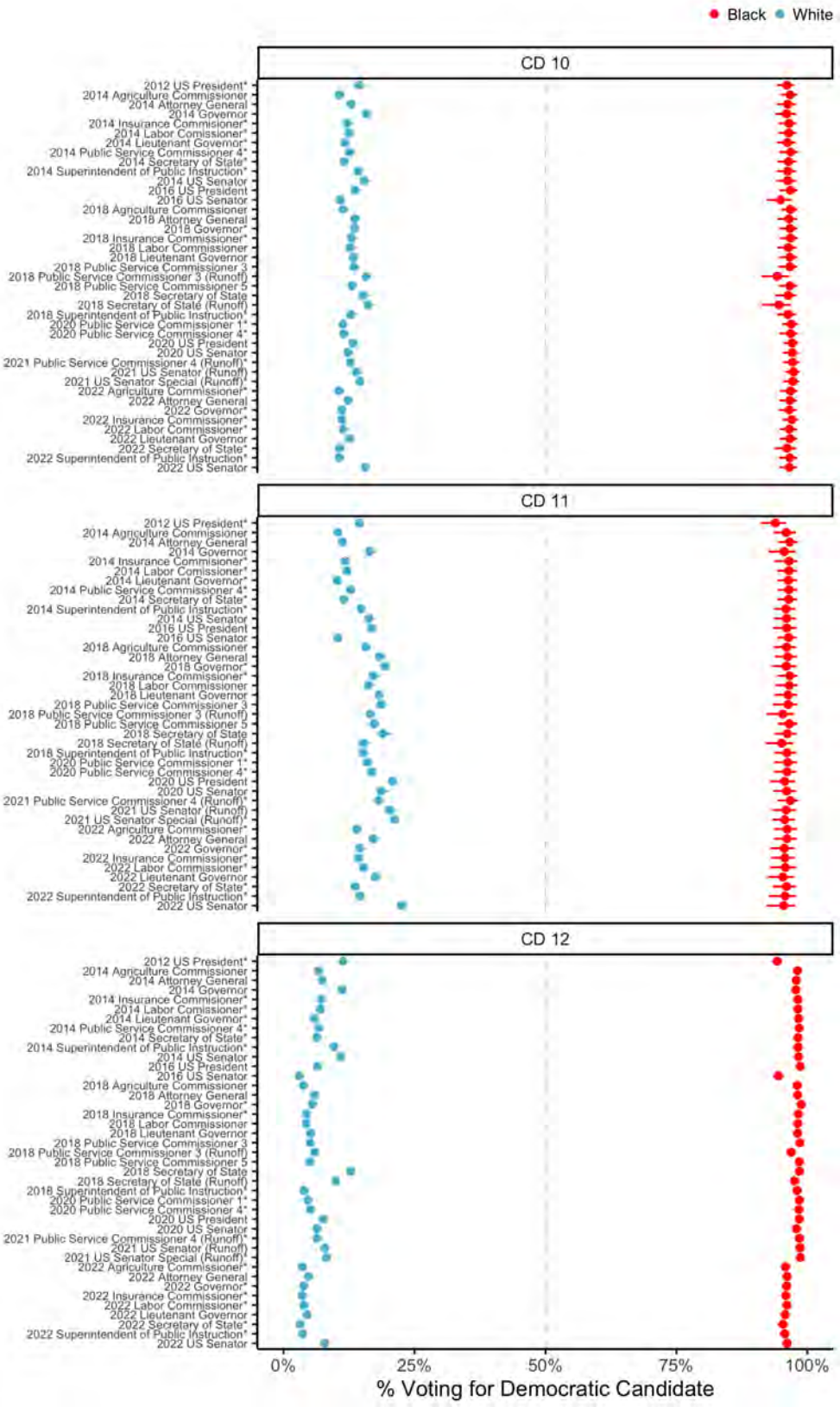

Figure 6: Ecological Inference Results — Enacted Congressional Districts (Historical Elections, Two-Party Vote Shares)

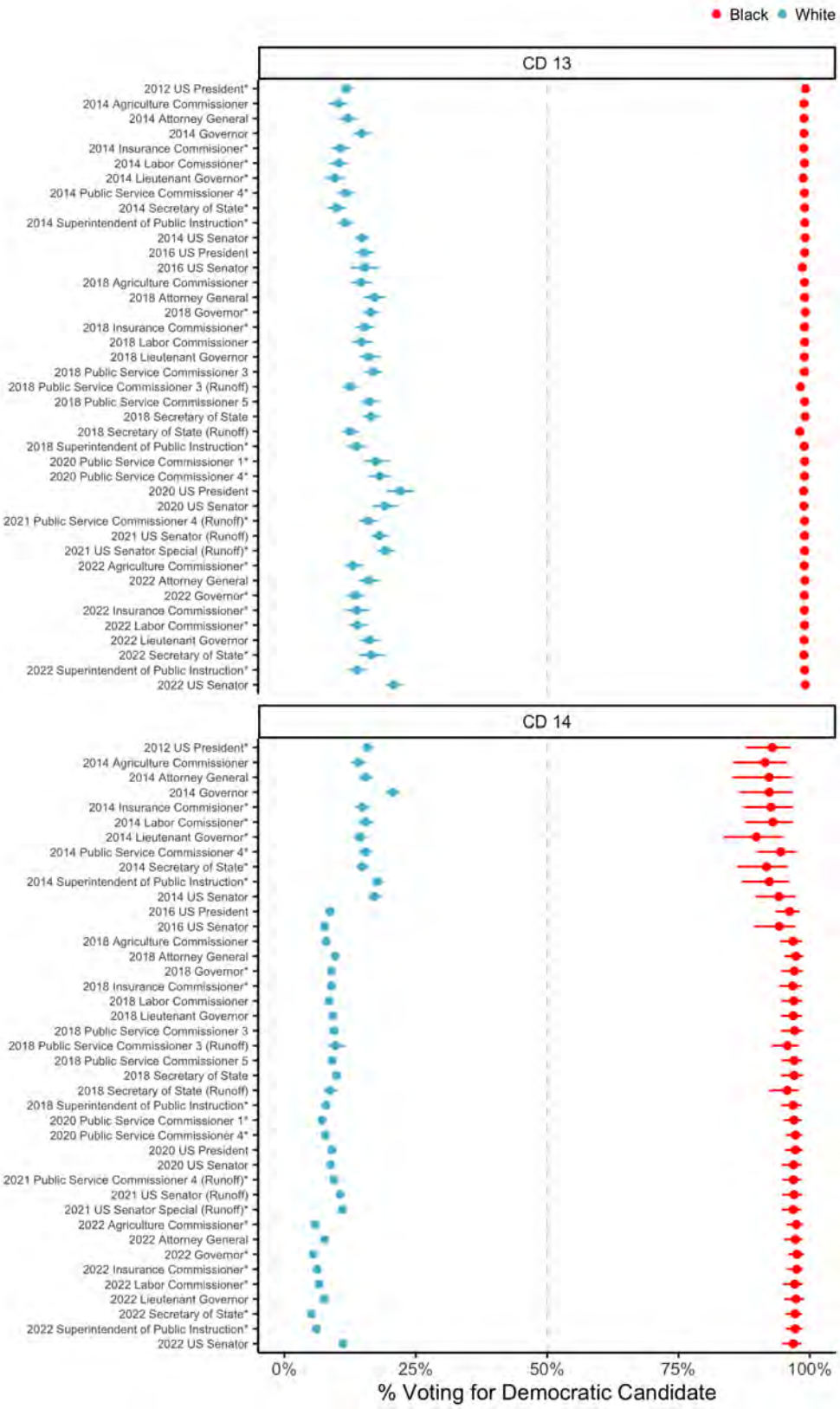

Figure 7: Ecological Inference Results — Enacted Congressional Districts (Historical Elections, Two-Party Vote Shares)

State Senate Districts

38. I was asked to examine enacted State Senate districts (SDs) that meaningfully overlapped with any focus illustrative SDs drawn by the plaintiffs' expert Moon Duchin. Therefore, I examine enacted SDs whose areas are comprised of 10% or more of an illustrative SD. Specifically, I analyze SDs 9, 16, 17, 22, 23, 25, 26, 28, 34, 35, 40, 41, 43, 44 and 55. Figure 8 presents a map of SDs in Georgia, with the districts in question shaded in dark gray. The SDs I am considering stretch in an almost contiguous band from west Georgia through Metro Atlanta to the eastern part of the state.

39. Of these districts, I have been asked to examine the extent of RPV between Black and Hispanic voters on the one hand and White voters on the other hand in SDs 16, 22, 23, 25, 26 and 44.[23] In all other SDs, I examine RPV between Black and White voters.

40. Figures 9-12 present the results of the EI analysis. I include estimates for Hispanic voter behavior in those districts where I have been instructed to examine it, and I omit it for the other districts. SDs 16, 22, 23, 25, 26 and 44 exhibit clear evidence of RPV with Black and Hispanic voters cohering around minority candidates and White voters opposing them in every historical election

[23]Since Hispanic voters comprise a small share of the electorate in many SDs, and the SDs sometimes contain a small number of precincts, when analyzing RPV with Hispanic voters I perform a statewide EI analysis to determine precinct-level estimates, then I aggregate the precinct-level estimates up to the district in question. Compared with an EI analysis restricted to a single district, this approach adds an assumption that racial group voting behavior outside of the district contains useful information about racial group voter behavior within the district. This is similar in nature to the maintained assumption in any district-level EI analysis that behavior in one precinct is informative about behavior in another.

with a minority candidate that I examine. SDs 9, 17, 28, 34, 35, 43 and 55 exhibit evidence of RPV between Black and White voters, again with Black voters cohering around the minority candidate and White voters opposing this candidate.

41. For SDs 40 and 41 the evidence is slightly less clear cut. In SD 41, White voters join Black voters in support for minority candidates more than half the time. In my judgment, there is not racially polarized voting in this district. Importantly, it is worth noting that SD 41's boundaries contain less than half of an Illustrative district.[24] On the other hand, in SD 40 White voters opposed minority candidates in all but a handful of elections. Given the overall record of historical elections, my assessment is that there is evidence of RPV in SD 40.

42. Aside from the above exceptions, there is evidence of racially polarized voting behavior between Black and White voters in every other State Senate district I analyzed. Black voters clearly supported the minority-preferred candidate in every election under study, including those elections with a minority candidate running. White voters opposed their candidate of choice. Similarly, in the districts where I have been asked to assess behavior among Hispanic voters, I find evidence of RPV with Black and Hispanic voters supporting the minority-preferred canddiate and White voters opposing them in every election.

[24]About 39.6% of Illustrative Map 1 SD 40 is contained in enacted SD 41.

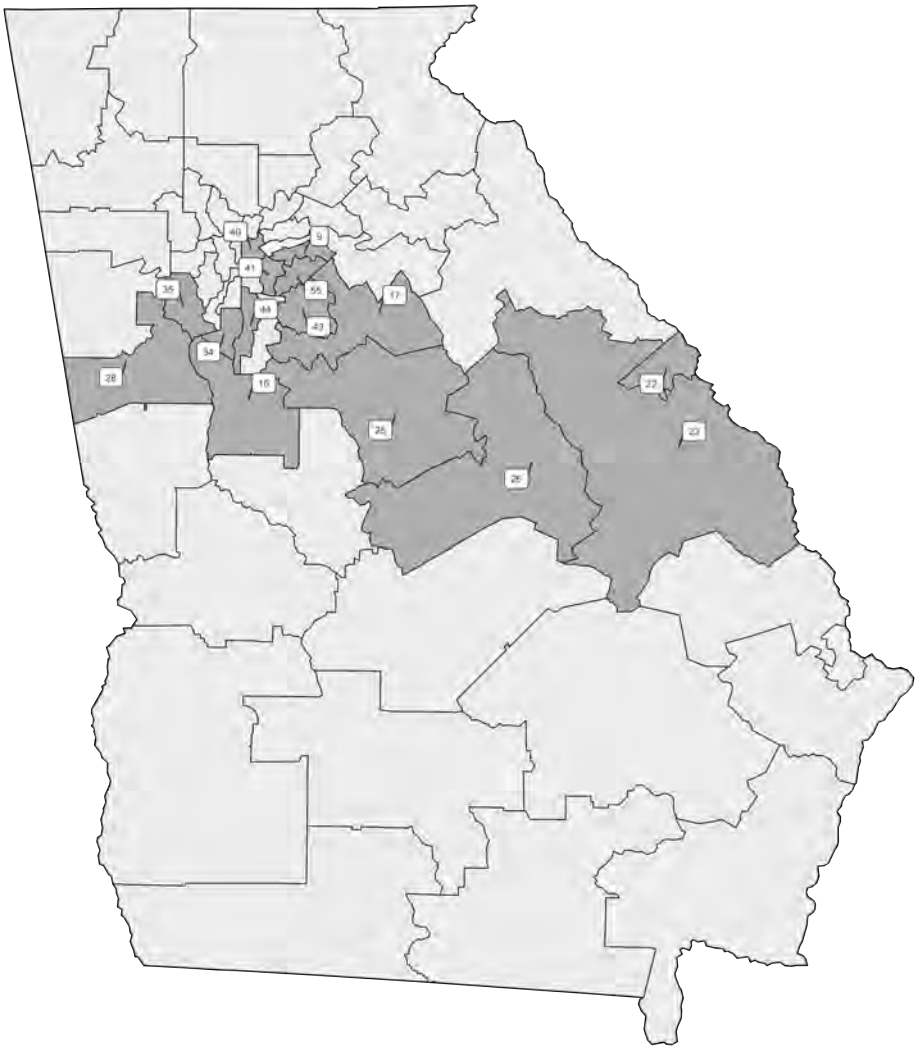

Figure 8: Map of Focus State Senate Districts

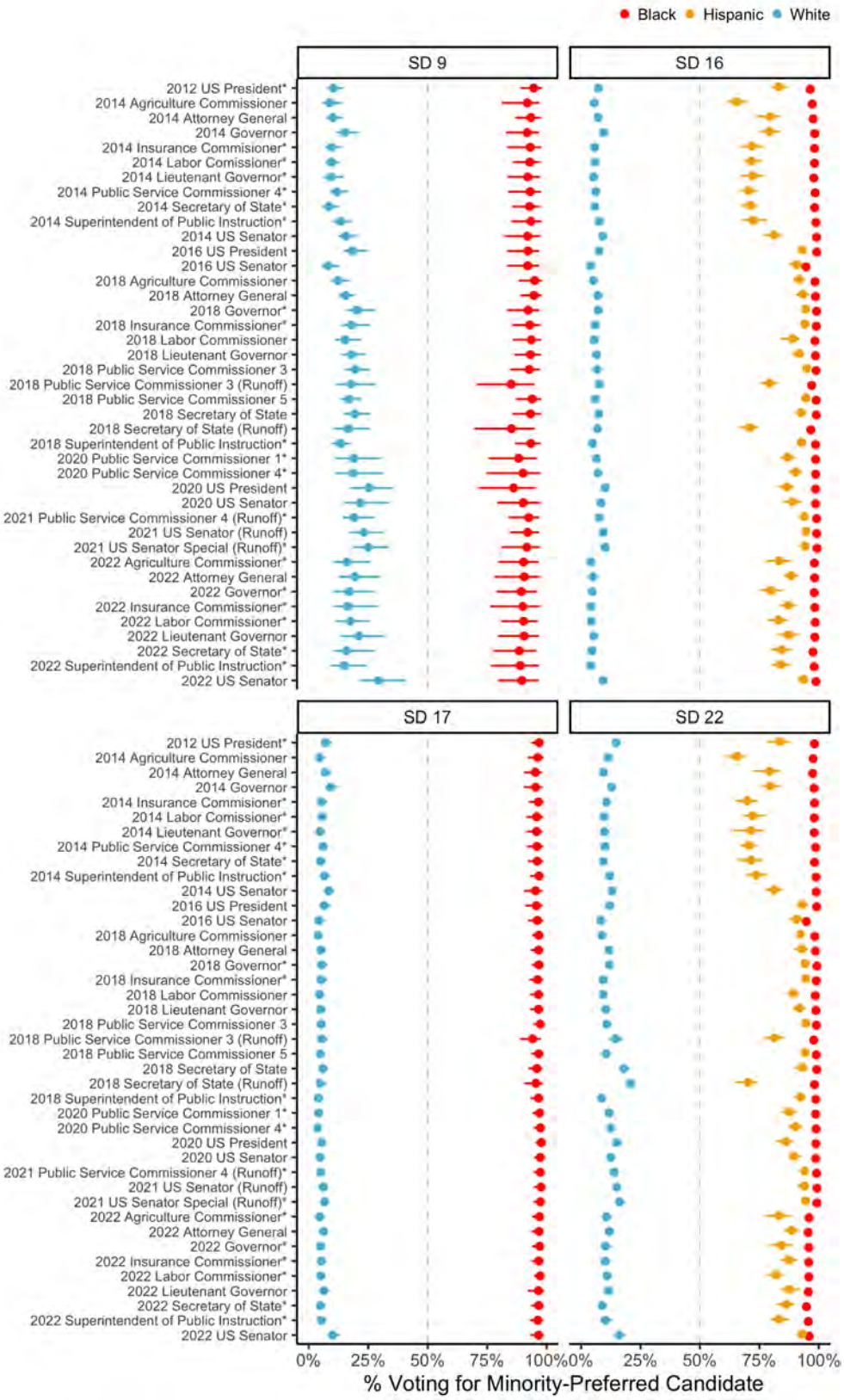

Figure 9: Ecological Inference Results — State Senate Districts (Historical Elections, Two-Party Vote Shares)

Figure 10: Ecological Inference Results — State Senate Districts (Historical Elections, Two-Party Vote Shares)

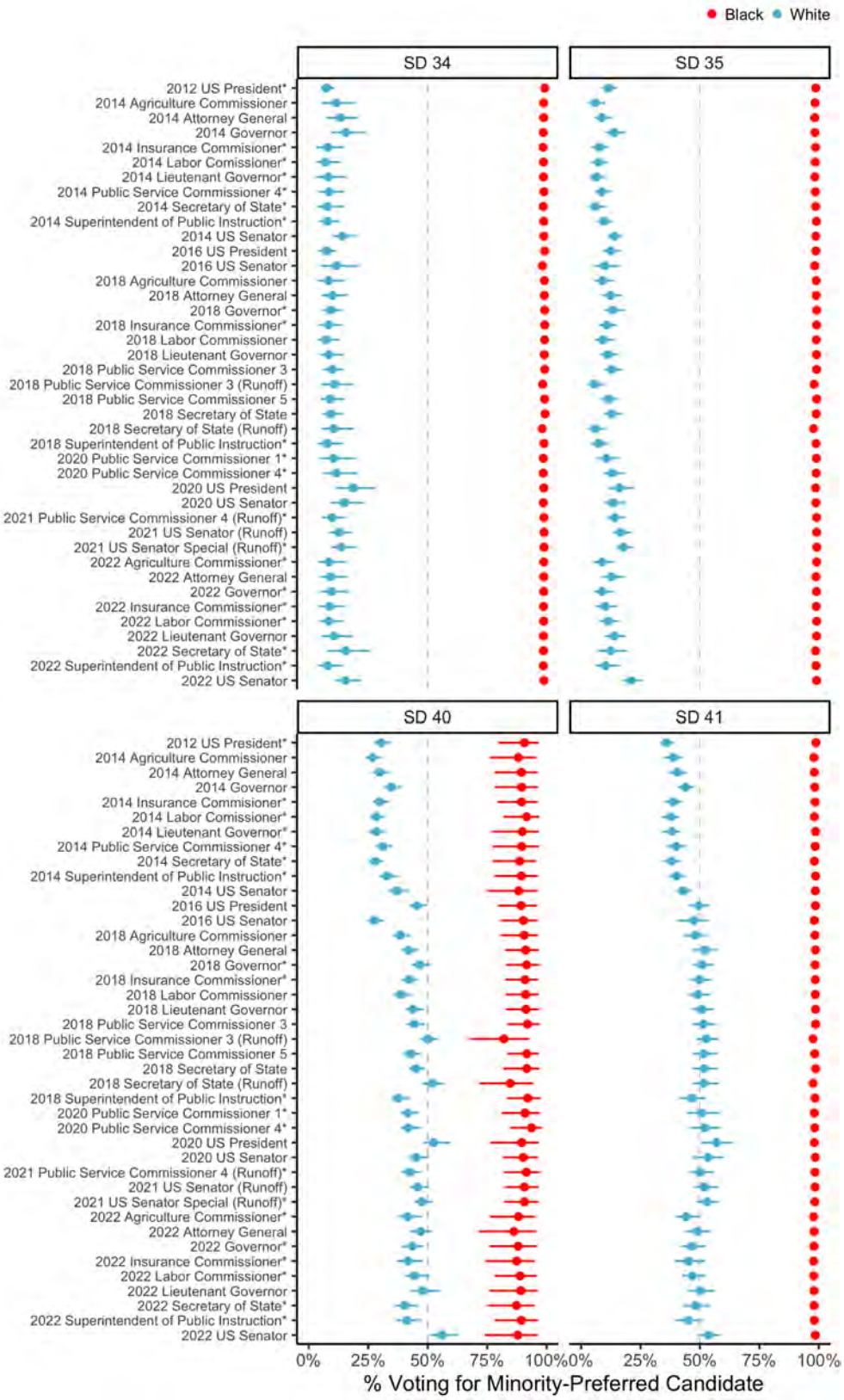

Figure 11: Ecological Inference Results — State Senate Districts (Historical Elections, Two-Party Vote Shares)

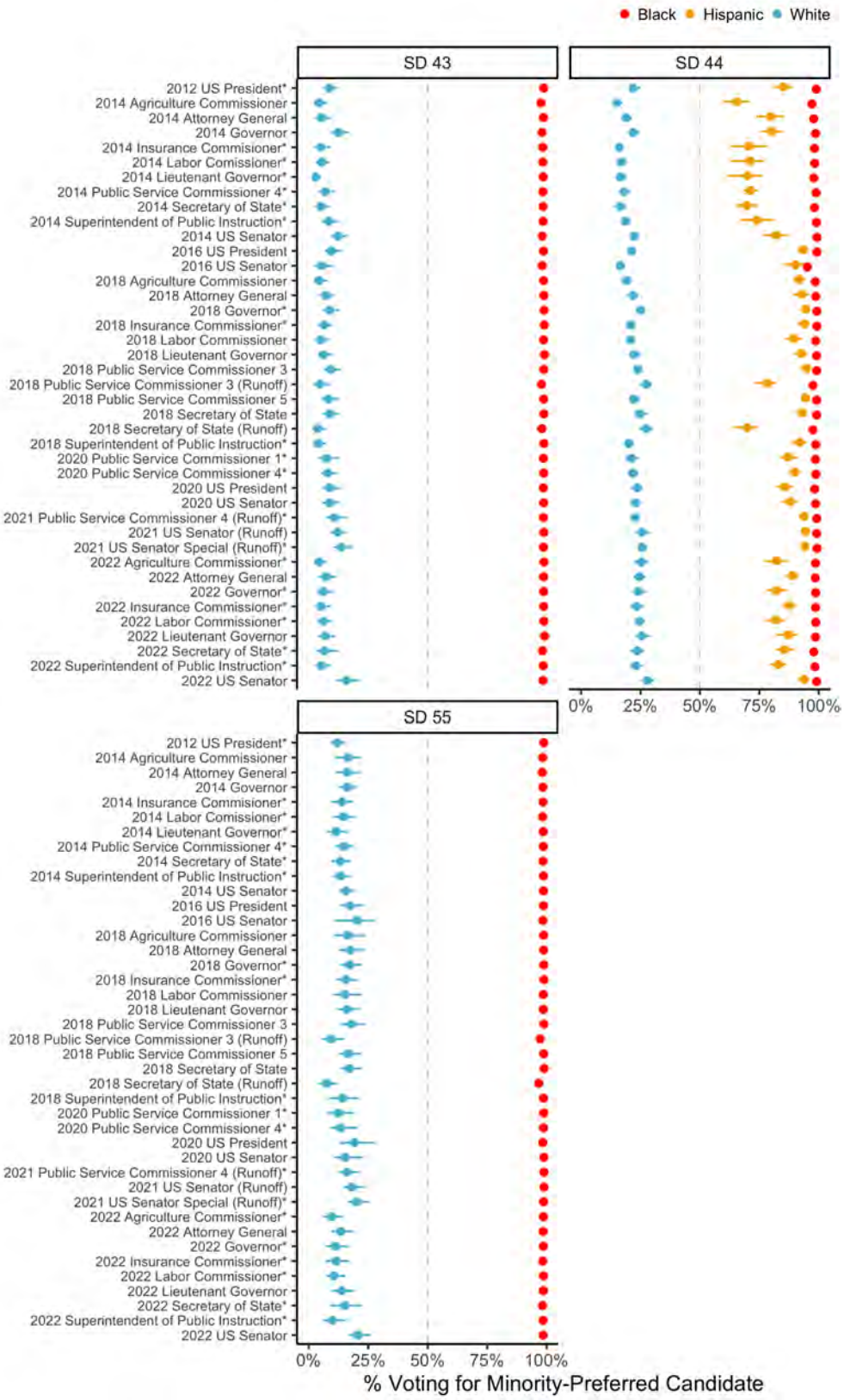

Figure 12: Ecological Inference Results — State Senate Districts (Historical Elections, Two-Party Vote Shares)

State House Districts

43. I was asked to examine enacted State House districts (LDs) that meaningfully overlapped with any focus illustrative LDs drawn by the plaintiffs' expert Moon Duchin. As before, I examine enacted LDs whose areas are comprised of 10% or more of an illustrative LD. Specifically, I analyze LDs 61, 64, 65, 66, 74, 78, 115, 116, 117, 140, 142, 143, 151, 154, 161, 163, 165 and 171. Figure 13 presents a map of LDs in Georgia, with the districts in question shaded in dark gray.

44. Of these districts, I have been asked to examine the extent of RPV between Black and Hispanic voters on the one hand and White voters on the other hand in LDs 161, 163 and 165.[25] In all other LDs, I examine RPV between Black and White voters.

45. Drawing conclusions from the EI analysis for the individual Georgia state House Districts can be slightly more challenging than for the other districts in the report since State House districts themselves are small and sometimes contain few precincts (e.g., less than fifteen). I have elected to report all results because with the Bayesian estimation methods used for EI they remain valid even for small samples; however, it is worth noting that some estimates will have wide confidence intervals, not necessarily due to voter behavior but simply because of the limited data available.

46. Figures 14-18 present the estimates for the House districts that I examine. LDs 61, 65, 74, 115, 142, 143, 151, 154 and 171 present clear evidence of RPV with Black voters selecting the minority candidates as their candidate of choice,

[25] I use the same method as with the State Senate districts to perform this analysis.

and White voters opposing these candidates in every historical election. LDs 161, 163 and 165 similarly present clear evidence of RPV with Black and Hispanic voters cohering to select the minority candidates as their candidate of choice, and White voters opposing these candidates in every historical election.

47. Of these districts with Black and Hispanic voters cohering, LDs 163 and 165 occasionally see White voters join with minority voters to support a minority-preferred candidate; however, this happens rarely and in fact never occurs when a minority candidate runs for election against a non-minority candidate.

48. For LDs 78 and 117 there is some uncertainty in the estimates for subsets of elections, but on balance the estimates show that Black voters supported minority candidates and were opposed by White voters in a vast majority of historical elections. For LD 116, the estimates reflect some uncertainty in the behavior of White voters, but there is significant evidence of RPV in 65% of elections and there is evidence of RPV in all 2022 statewide elections.

49. To sum up, then, I observe RPV between Black and White voters in LDs 61, 65, 74, 78, 115, 116, 117, 142, 143, 151, 154 and 171 and between Black and Hispanic voters on the one hand and White voters on the other in LDs 161, 163 and 165.

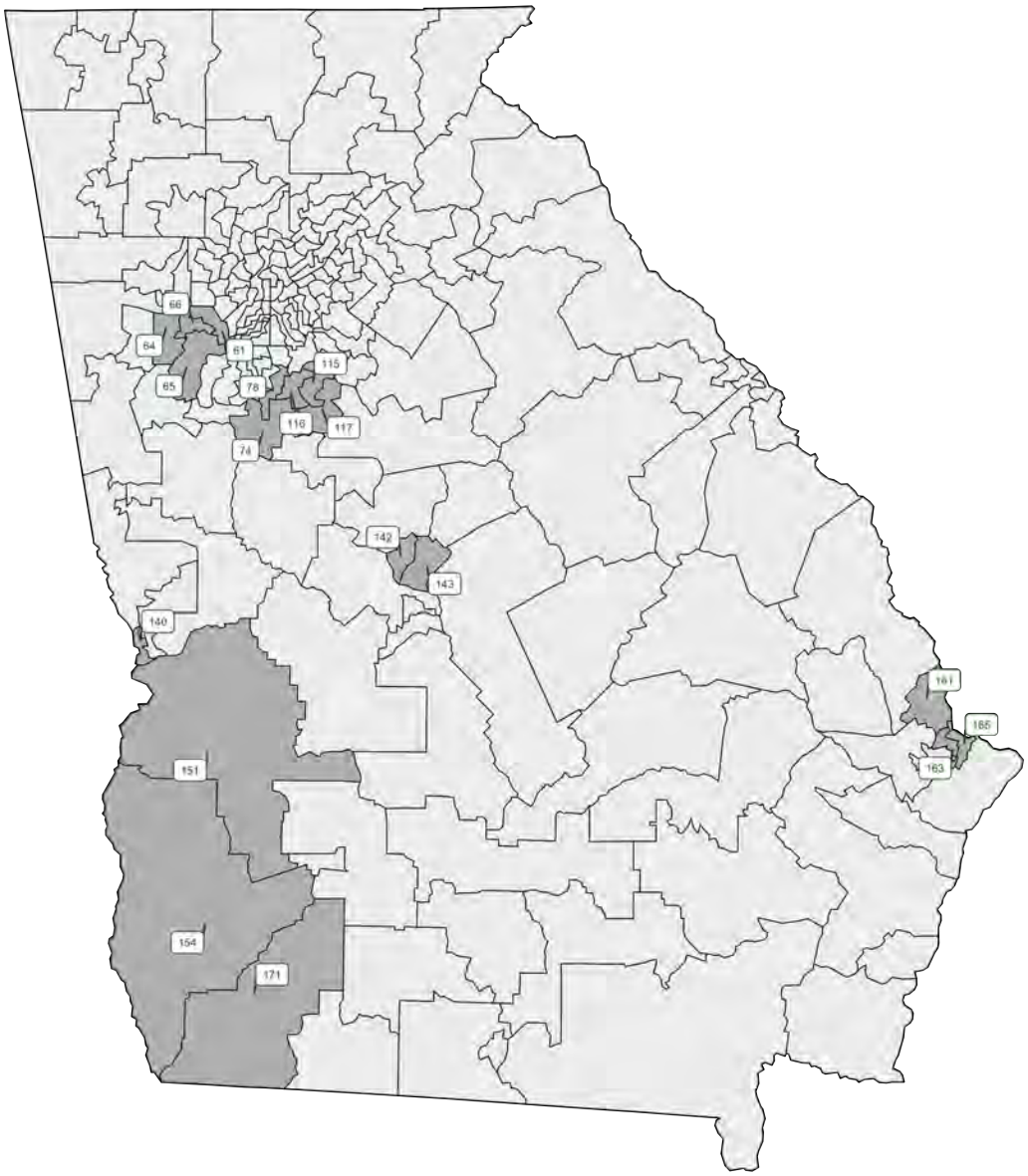

Figure 13: Map of Focus State House Districts

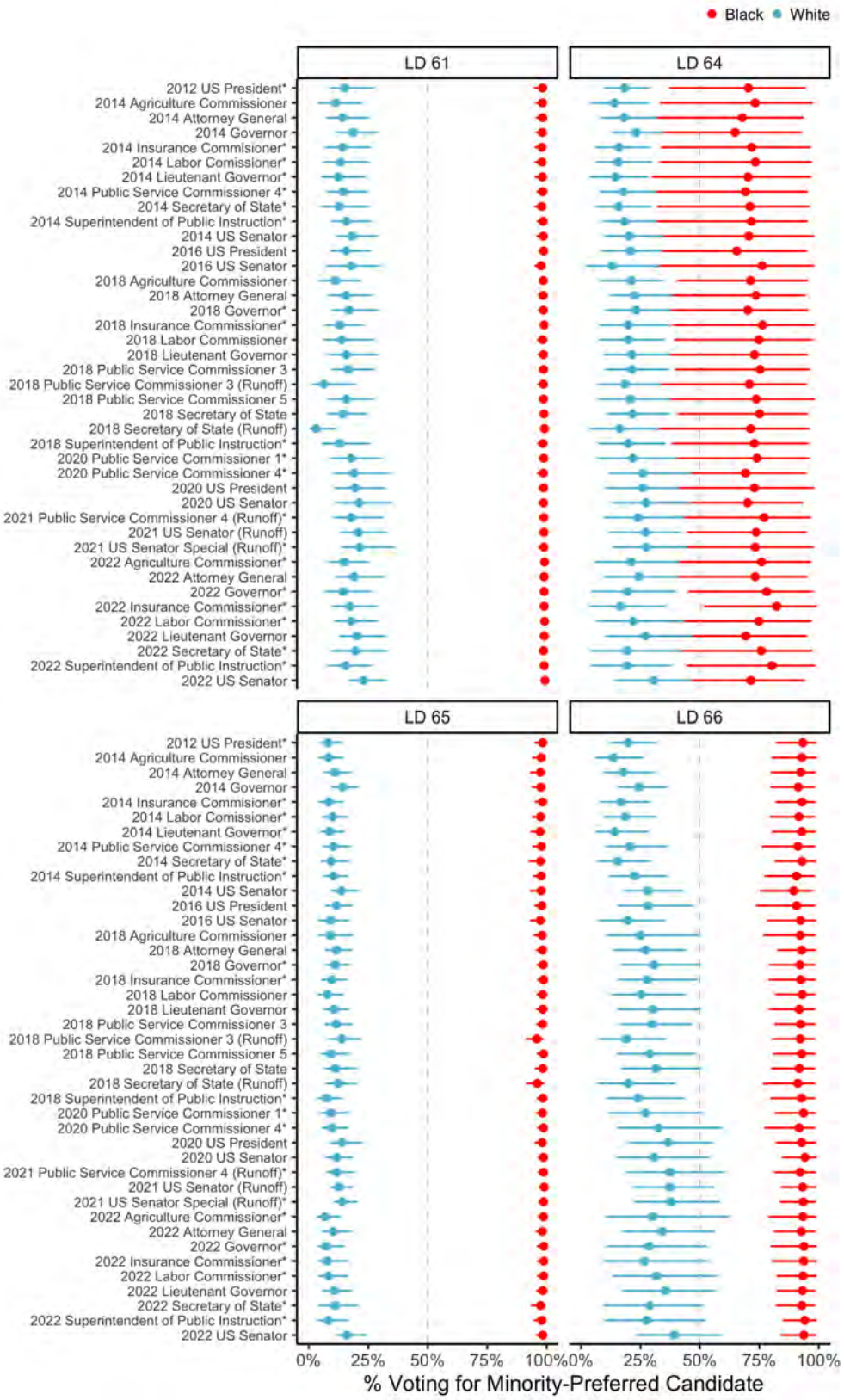

Figure 14: Ecological Inference Results — State House Districts (Historical Elections, Two-Party Vote Shares)

Figure 15: Ecological Inference Results — State House Districts (Historical Elections, Two-Party Vote Shares)

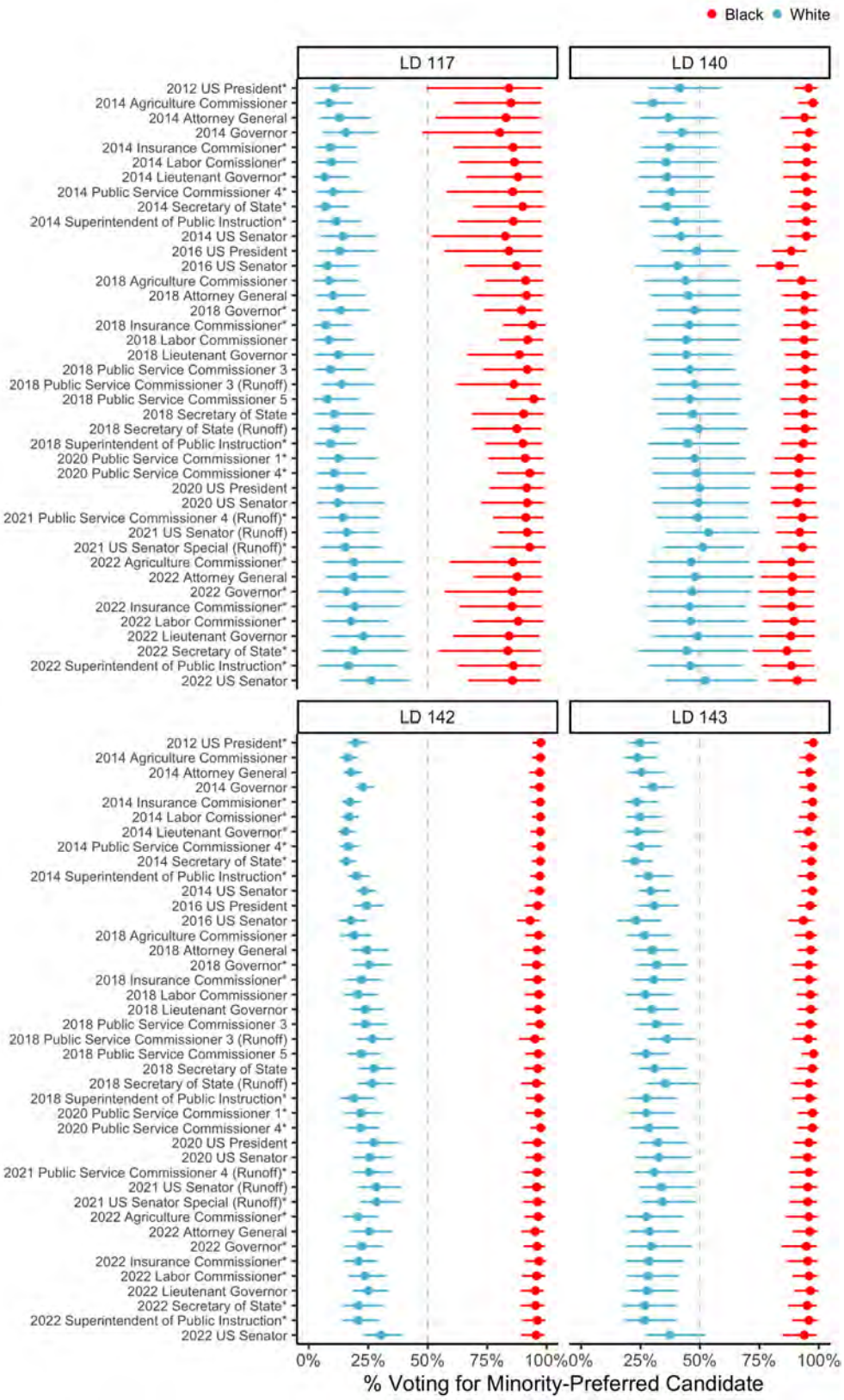

Figure 16: Ecological Inference Results — State House Districts (Historical Elections, Two-Party Vote Shares)

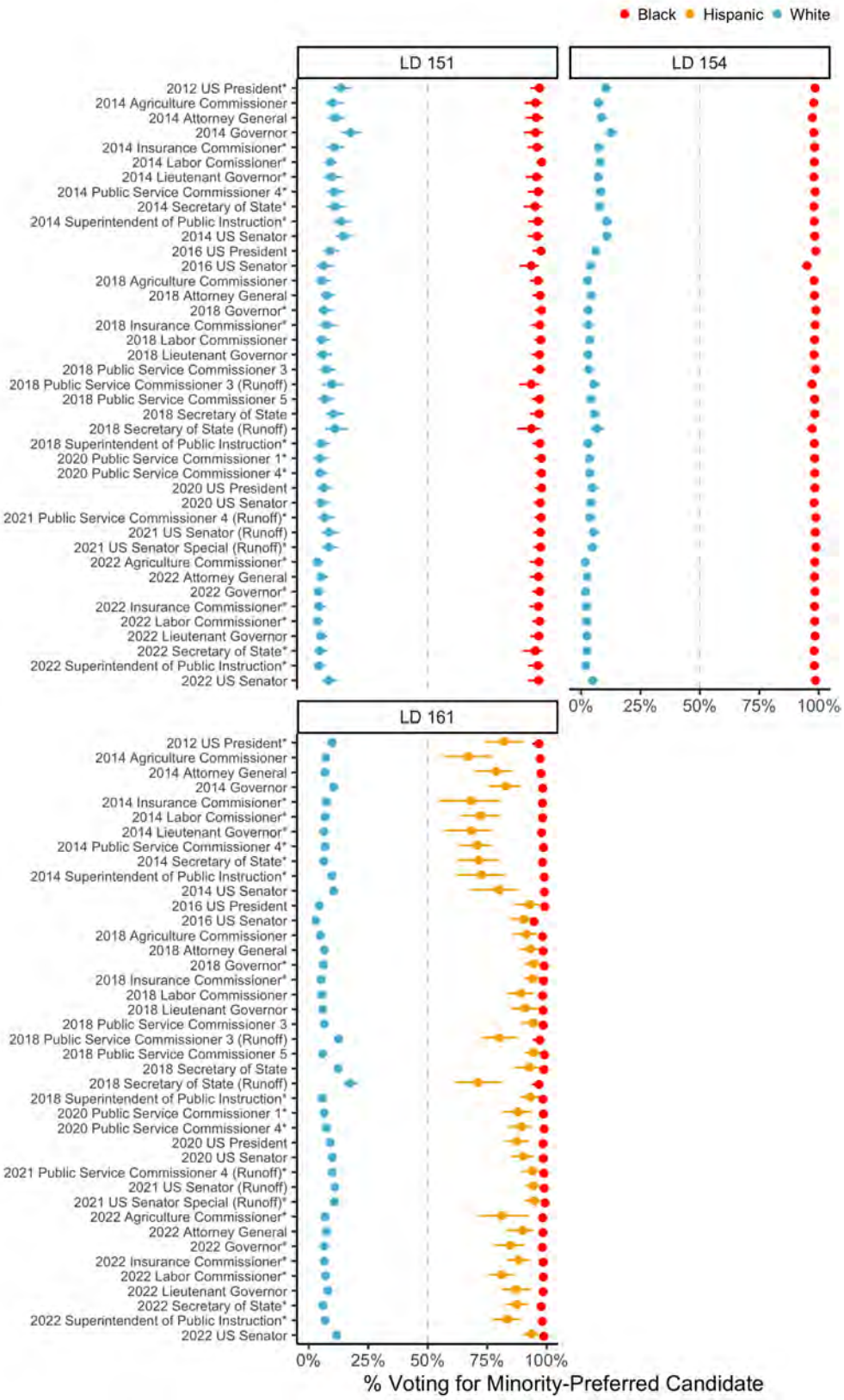

Figure 17: Ecological Inference Results — State House Districts (Historical Elections, Two-Party Vote Shares)

Figure 18: Ecological Inference Results — State House Districts (Historical Elections, Two-Party Vote Shares)

Clusters

50. I have also been asked to examine the extent of RPV in geographic clusters that were used as the starting point for drawing the plaintiffs' illustrative maps. Appendix Figure 30 depicts the geographic clusters given to me for the state Senate map. These clusters partition the state's Senate districts into the following broad geographic areas: Atlanta, East Black Belt, Gwinnett, Northwest, Southeast and Southwest. The plaintiffs' map-drawing expert Moon Duchin has created new illustrative Maps with districts focused in the Atlanta, East Black Belt and Gwinnett clusters. Therefore, I perform an EI analysis pooling the state Senate districts into these clusters. Figure 19 presents the results.

51. Across these clusters, I observe evidence of RPV between White and Black voters. For each cluster, Black voters cohesively support a candidate of choice and White voters oppose these candidates systematically. Furthermore, Hispanic voters tend to support the same candidates of choice as Black voters. In the Atlanta and Gwinnett clusters, Hispanic voters cohesively support the same candidate of choice as Black voters and the lower confidence interval on the vote share estimate does not overlap withe the 50% threshold in all elections where a minority candidate runs against a non-minority candidate. In fact, the only exceptions are two runoff elections in 2018. In the East Black Belt cluster, Hispanic voters also systematically support the same candidates of choice as Black voters. The estimates for elections before 2016 tend to be more uncertain, with the confidence intervals including the 50% threshold; however,

since 2016 the estimates are more certain and we can conclude that Hispanic voters supported the same candidates of choice as Black voters. Thus, based on the historical elections observed and in particular those since 2016, I conclude that for each of these clusters Black and Hispanic voters vote cohesively for the same candidate of choice and White voters oppose this candidate.

52. I perform a similar exercise for State House districts. Appendix Figure 31 illustrates the geographic starting clusters for the map drawing exercise for state House districts. As before, these clusters partition the state's House districts into the following broad geographic areas: Atlanta, Cobb, DeKalb, East Black Belt, Gwinnett, Southeast and Southwest. Note that though some of the names for these clusters are identical to the cluster names for the state Senate districts, the boundaries differ. Of these clusters, Moon Duchin has drawn new districts focused on the Atlanta, Southwest, East Black Belt and Southeast clusters. As a result, I perform an EI analysis pooling the relevant state House Districts into these clusters. Figure 20 presents the results.

53. Again, I observe evidence of RPV between White and Black voters across all state House clusters I examine. Black voters cohesively support a candidate of choice and White voters oppose this candidate. Based on my estimates, this is true in every cluster and for every statewide election that I examine.

54. Hispanic voters join Black voters in supporting the same candidate of choice in each cluster. In Atlanta, this is true for all past statewide elections pitting a minority candidate against a non-minority candidate, with the confidence intervals never overlapping with the 50% threshold for these elections. For the

other House clusters, while there are some uncertainties, my estimates again suggest that Hispanic voters supported the same candidates as Black voters in all of the past statewide elections that I examine.

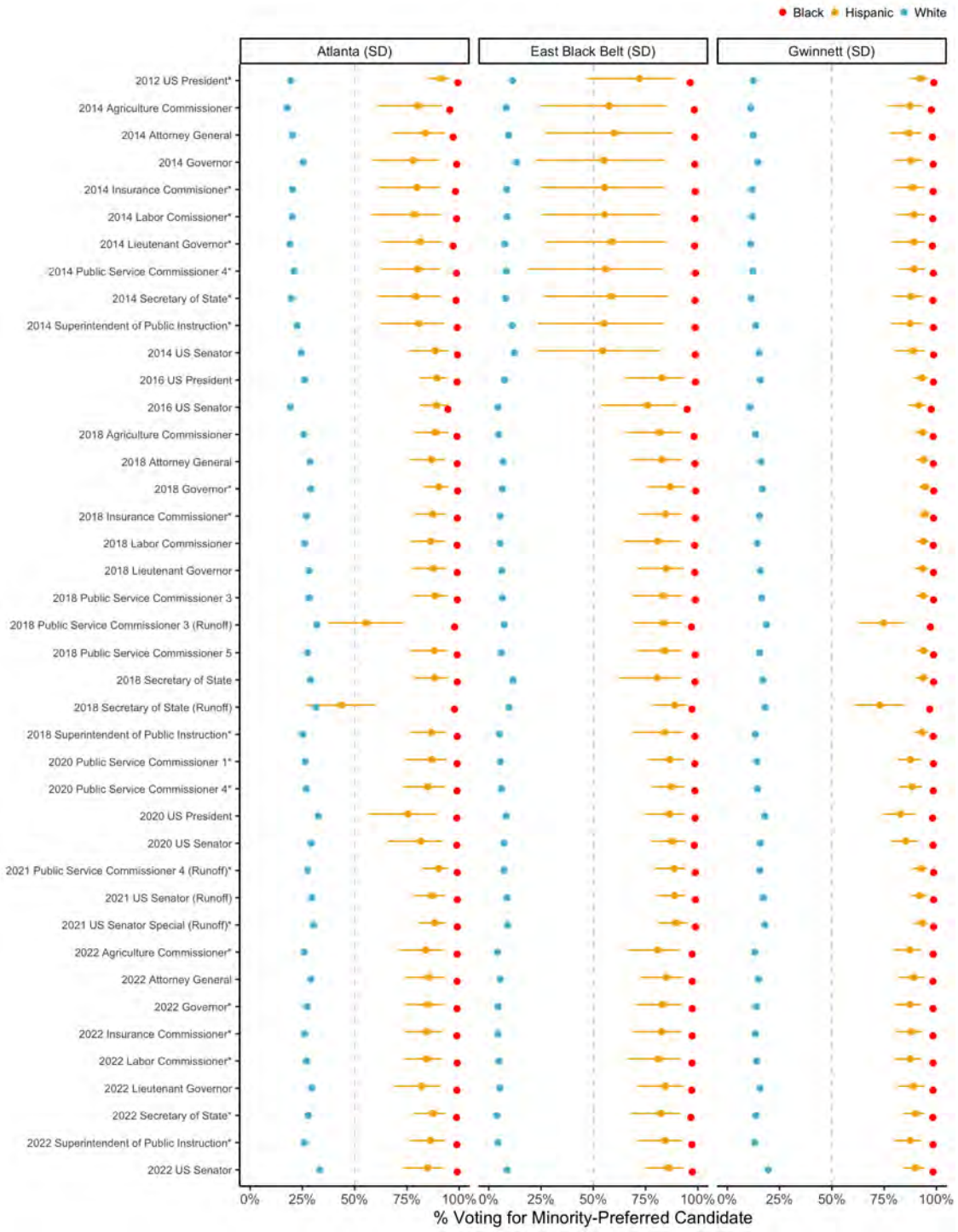

Figure 19: Ecological Inference Results — State Senate Clusters (Historical Elections, Two-Party Vote Shares)

Figure 20: Ecological Inference Results — State House Clusters (Historical Elections, Two-Party Vote Shares)

Performance Analysis of Enacted Districts

55. I now examine the electoral performance of the enacted congressional districts along with the focus enacted state Senate and enacted state House districts. The previous analysis established that in Georgia, in those instances where one minority candidate runs for office and there is racially polarized voting, the candidate of choice for minority voters has historically been the minority candidate. As a result, I use historical election data to examine whether the enacted districts appear to offer minority voters an opportunity to elect their candidates of choice.

Congressional Districts

56. Table 2 presents the 2020 and 2022 share of the electorate for each minority group under consideration, along with several key summary statistics for district-wide electoral performance. To analyze district performance in terms of the ability to elect minority-preferred candidates, I examine the 20 statewide elections considered in this report in which a racial minority candidate ran against a non-minority candidate since 2012. Table 10 in the Appendix denotes these elections with a star and reports the names of these candidates. I report the mean two-party minority-preferred candidate vote share across all elections with a minority candidate that I examined. I also report the lowest vote share received by a minority candidate, in order to provide a sense of a lower bound of electoral performance. Finally, based on the historical elections, I report the share of elections in which minority candidates would have earned a

majority of the two-party vote in the district, along with the share of elections in which minority candidates would have earned over 55% of the vote, which is a conventional cutoff used in voting rights litigation to indicate a safer district.

57. In CDs 4 and 13, Black voters comprise a majority (or near-majority) of the electorate and, based on historical elections, these voters would be able to elect their candidates of choice if conditions in the districts remain similar. Minority-preferred candidates earned a majority of the two-party vote share in each election I examined for these districts, and the vote share surpassed 55% in every election in CDs 4 and 13.

58. In CDs 1, 3, 6, 8, 9, 10, 11, 12 and 14, White voters comprise a strong majority of the electorate. If conditions remain similar to historical elections, minority voters who preferred a minority candidate would not be able to elect that candidate: the minority-preferred candidate did not win in **any** of the historical elections I examine for these districts.

59. CD 7 is a multi-racial district in which no one racial group comprises a majority of the electorate. Based on historical elections, minority candidates in these statewide elections would have received a majority in the district 65.0% of the time. Candidates won "safely" (e.g., over 55% of the vote) at the same rate. Given the demographic composition of the district, and the fact that the previous RPV analysis showed strong evidence of Black voters cohesively supporting minority candidates, this is a district that could perform more strongly than it does as drawn (in terms of allowing minority voters to elect their candidates of choice).

60. CD 2 is split close to evenly between Black and White voters. In 2022, White voters comprised 56% of the electorate, and Black voters comprised 37%. Black voters retained the ability to elect candidates of choice in this district, with that candidate winning every statewide election I examined in this district.

61. CD 5 did not exhibit RPV in the previous analysis. White voters have historically voted along with minority voters to select minority voters' candidates of choice.

62. Overall, then, minority voters have a very strong chance of electing preferred candidates in three of fourteen congressional districts (CDs 4, 5 and 13). Minority voters have a chance of electing minority candidates slightly more than half the time in CDs 2 and 7. Finally, based on historical elections, minority voters have close to no chance of electing preferred candidates in the remaining nine congressional districts.

Table 2: Performance Analysis (Elections with a Minority Candidate), Enacted CDs

CD	Black 2020	Black 2022	Hispanic 2020	Hispanic 2022	Mean M Vote	Min M Vote	M Wins	M Over 55%
1	24.3%	23.5%	2.0%	1.6%	41.0%	39.0%	0.0%	0.0%
2	44.6%	36.9%	1.3%	0.9%	51.7%	44.4%	70.0%	25.0%
3	18.8%	23.2%	1.9%	1.8%	32.9%	28.1%	0.0%	0.0%
4	50.9%	46.7%	2.5%	2.1%	74.1%	69.0%	100.0%	100.0%
5	40.4%	38.2%	2.4%	2.3%	79.0%	73.9%	100.0%	100.0%
6	7.3%	7.2%	3.5%	3.2%	33.1%	24.1%	0.0%	0.0%
7	29.3%	27.4%	7.5%	5.5%	54.1%	43.4%	65.0%	60.0%
8	25.0%	24.0%	1.5%	0.9%	33.6%	31.3%	0.0%	0.0%
9	8.5%	9.7%	4.7%	3.3%	26.2%	21.4%	0.0%	0.0%
10	18.6%	17.9%	2.3%	2.0%	34.6%	30.8%	0.0%	0.0%
11	14.6%	13.4%	4.0%	3.2%	35.6%	28.1%	0.0%	0.0%
12	31.7%	28.1%	1.5%	1.3%	41.1%	37.5%	0.0%	0.0%
13	63.7%	63.4%	3.3%	2.4%	77.7%	71.8%	100.0%	100.0%
14	13.1%	14.0%	3.8%	2.4%	29.5%	27.8%	0.0%	0.0%

Note: This table reports the share of the electorate, based on 2020 and 2022 turnout, of each minority racial group in a given congressional district along with the mean and minimum minority candidate vote share (labelled M) in the district across statewide elections with a minority candidate since 2012.

State Senate Districts

63. In the state Senate districts under consideration, there appears to be only a handful of competitive districts. Most either offer no chance for the election of minority-preferred candidates or are, on the other hand, clear minority majority districts. Based on historical elections, the candidate preferred by minority voters would not have won in any election I examine between 2012 and 2022 in SDs 16, 17, 23, 25 and 28. Conversely, in SDs 22, 26, 34, 35, 41, 43, 44 and 55 the minority-preferred candidate would have won in all past elections I examine.

64. SDs 9 and 40 are the only focus districts with some evidence of possibly meaningful electoral competition. SD 9 is a multi-racial district that has elected minority voters' candidates of choice slightly more than half of the time. SD 40, a district with a majority White electorate, has performed similarly in past elections.

Table 3: Performance Analysis (Elections with a Minority Candidate), Enacted SDs

SD	Black 2020	Black 2022	Hispanic 2020	Hispanic 2022	Mean M Vote	Min M Vote	M Wins	M Over 55%
9	28.5%	28.8%	7.4%	5.9%	51.6%	38.8%	65.0%	60.0%
16	18.0%	26.3%	1.9%	1.9%	33.8%	26.8%	0.0%	0.0%
17	26.2%	24.4%	1.8%	1.7%	35.1%	29.3%	0.0%	0.0%
22	55.3%	51.8%	1.5%	1.2%	66.5%	62.6%	100.0%	100.0%
23	31.8%	26.1%	1.6%	1.4%	38.6%	34.0%	0.0%	0.0%
25	28.8%	27.5%	1.3%	0.8%	37.9%	35.6%	0.0%	0.0%
26	54.5%	44.3%	0.9%	0.8%	60.6%	52.3%	100.0%	70.0%
28	15.0%	24.8%	2.4%	1.7%	31.3%	24.6%	0.0%	0.0%
34	68.4%	68.6%	3.4%	2.6%	81.7%	76.8%	100.0%	100.0%
35	67.1%	68.5%	2.4%	1.6%	79.2%	71.5%	100.0%	100.0%
40	16.0%	13.9%	5.0%	4.1%	53.6%	42.5%	65.0%	65.0%
41	55.6%	51.1%	2.2%	1.9%	78.7%	73.9%	100.0%	100.0%
43	60.5%	60.1%	1.9%	1.4%	70.2%	62.9%	100.0%	100.0%
44	68.3%	67.3%	2.9%	2.2%	86.2%	82.1%	100.0%	100.0%
55	61.5%	58.6%	3.2%	2.3%	74.9%	69.0%	100.0%	100.0%

Note: This table reports the share of the electorate, based on 2020 and 2022 turnout, of each minority racial group in a given State Senate district along with the mean and minimum minority candidate vote share (labelled M) in the district across statewide elections with a minority candidate since 2012.

State House Districts

65. Based on historical elections, the candidate preferred by minority voters would not have won in any election I examine between 2012 and 2022 in LDs 16, 17, 23, 25 and 28. Conversely, in LDs 22, 26, 34, 35, 41, 43, 44 and 55 the minority-preferred candidate would have won in all past elections I examine.

66. LDs 115, 117, 151 and 154 are the only (possibly) competitive districts among the examined state House districts. The electorate for LD 151 is split roughly evenly between White and Black voters. Based on historical elections, the minority candidate of choice would have garnered a majority of the vote in this district in 65.0% of historical elections I examine. However, this does not appear to be a safe district by any means. In only 5.0% of elections was the margin at the level to call the district safe (e.g., over 55% of the two-party vote).

67. In LD 117, based on historical elections, minority voters are just now beginning to be able to elect minority-preferred candidates. Only in the three 2021 runoff elections and the 2022 general elections did minority candidates garner more than half the vote in this district, and in no cases was the margin of victory safe for the candidate of choice.

68. LDs 115 and 154 each offer minority voters the opportunity to elect minority candidates a bit more than half of the time based on historical elections.

Table 4: Performance Analysis (Elections with a Minority Candidate), Enacted LDs

LD	Black 2020	Black 2022	Hispanic 2020	Hispanic 2022	Mean M Vote	Min M Vote	M Wins	M Over 55%
61	70.6%	74.9%	2.1%	1.1%	84.3%	78.9%	100.0%	100.0%
64	26.8%	27.3%	3.2%	3.2%	38.0%	30.6%	0.0%	0.0%
65	54.2%	53.4%	1.8%	1.4%	67.5%	62.8%	100.0%	100.0%
66	50.9%	52.7%	3.3%	2.4%	63.5%	52.7%	100.0%	75.0%
74	21.2%	23.1%	2.2%	1.9%	32.6%	25.9%	0.0%	0.0%
78	67.9%	63.4%	3.2%	2.4%	78.4%	73.9%	100.0%	100.0%
115	45.5%	47.4%	2.7%	2.0%	55.8%	45.8%	65.0%	65.0%
116	52.5%	45.1%	2.9%	2.0%	59.5%	50.4%	100.0%	65.0%
117	34.5%	35.4%	2.4%	1.6%	42.8%	32.5%	10.0%	0.0%
140	58.6%	59.2%	2.4%	1.1%	75.2%	70.3%	100.0%	100.0%
142	53.9%	51.2%	0.8%	0.6%	62.0%	56.8%	100.0%	100.0%
143	58.3%	57.0%	0.9%	0.7%	70.2%	67.6%	100.0%	100.0%
151	44.3%	29.7%	0.9%	0.8%	46.8%	35.4%	65.0%	5.0%
154	49.8%	42.5%	0.4%	0.3%	52.5%	44.5%	70.0%	45.0%
161	22.4%	19.5%	3.1%	2.3%	34.1%	27.9%	0.0%	0.0%
163	42.8%	39.3%	1.8%	1.4%	67.4%	60.4%	100.0%	100.0%
165	54.5%	29.5%	1.2%	1.2%	72.0%	57.1%	100.0%	100.0%
171	32.4%	29.5%	1.0%	0.6%	38.0%	33.3%	0.0%	0.0%

Note: This table reports the share of the electorate, based on 2020 and 2022 turnout, of each minority racial group in a given State House district along with the mean and minimum minority candidate vote share (labelled M) in the district across statewide elections with a minority candidate since 2012.

EI Analysis of Illustrative Districts

69. I now turn to an EI analysis of the Illustrative Maps drawn by the plaintiffs' map-drawing expert Moon Duchin.

Congressional Districts

70. I have been instructed to analyze all congressional districts for RPV between Black and White voters in the Illustrative Map drawn by Moon Duchin. Appendix Figure 32 depicts the map of these illustrative districts.

71. Figures 21-25 report the results for my EI analysis. The results are quite straightforward. Illustrative CD 4 does not exhibit evidence of RPV between Black and White voters. In all other districts, there is essentially universal evidence of RPV between Black and White voters. In these districts, when a minority candidate runs Black voters support them and White voters oppose this candidate. In elections between no minority candidates or two minority candidates, Black voters support the minority-preferred candidate and White voters oppose them.

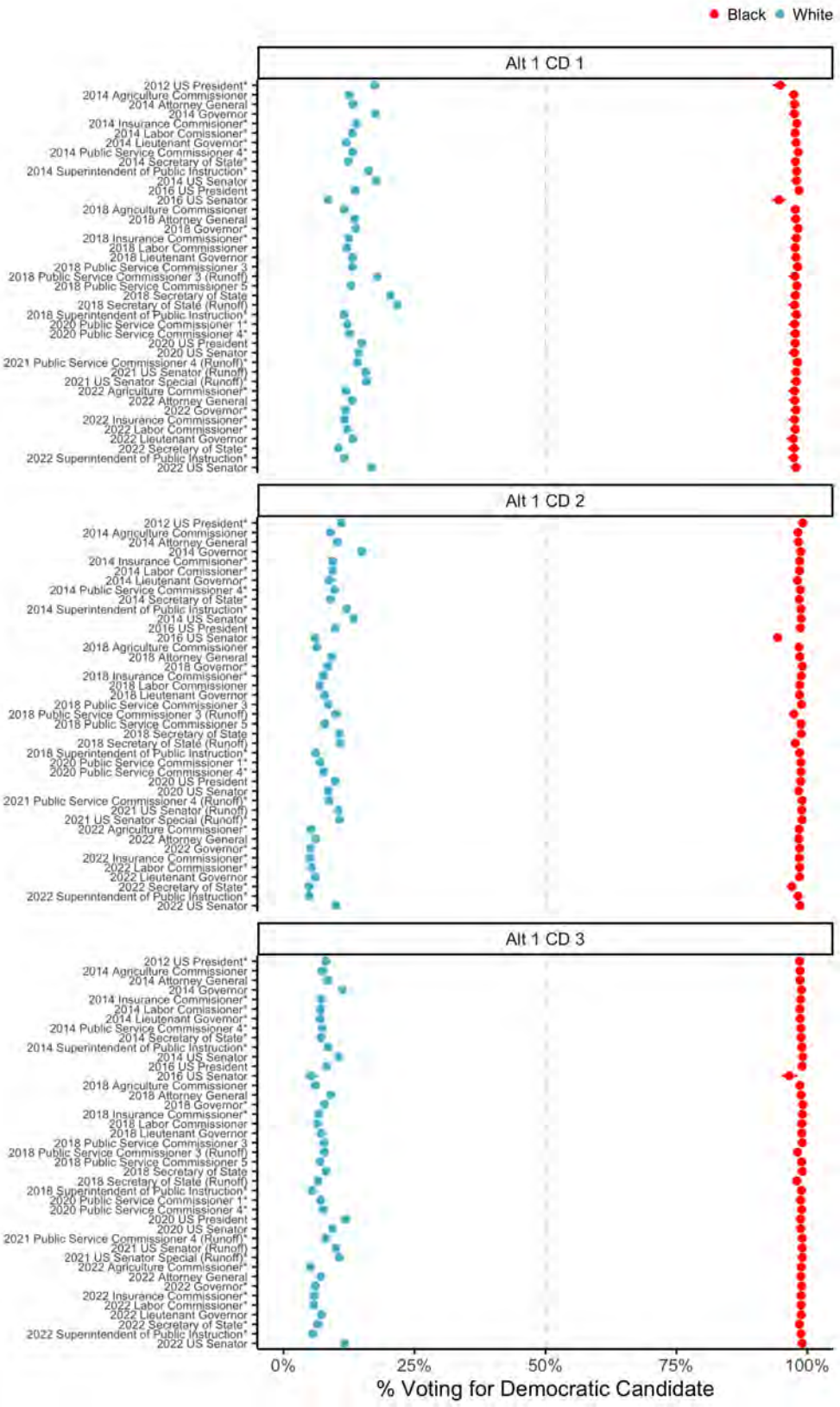

Figure 21: Ecological Inference Results — Illustrative Congressional Districts (Historical Elections, Two-Party Vote Shares)

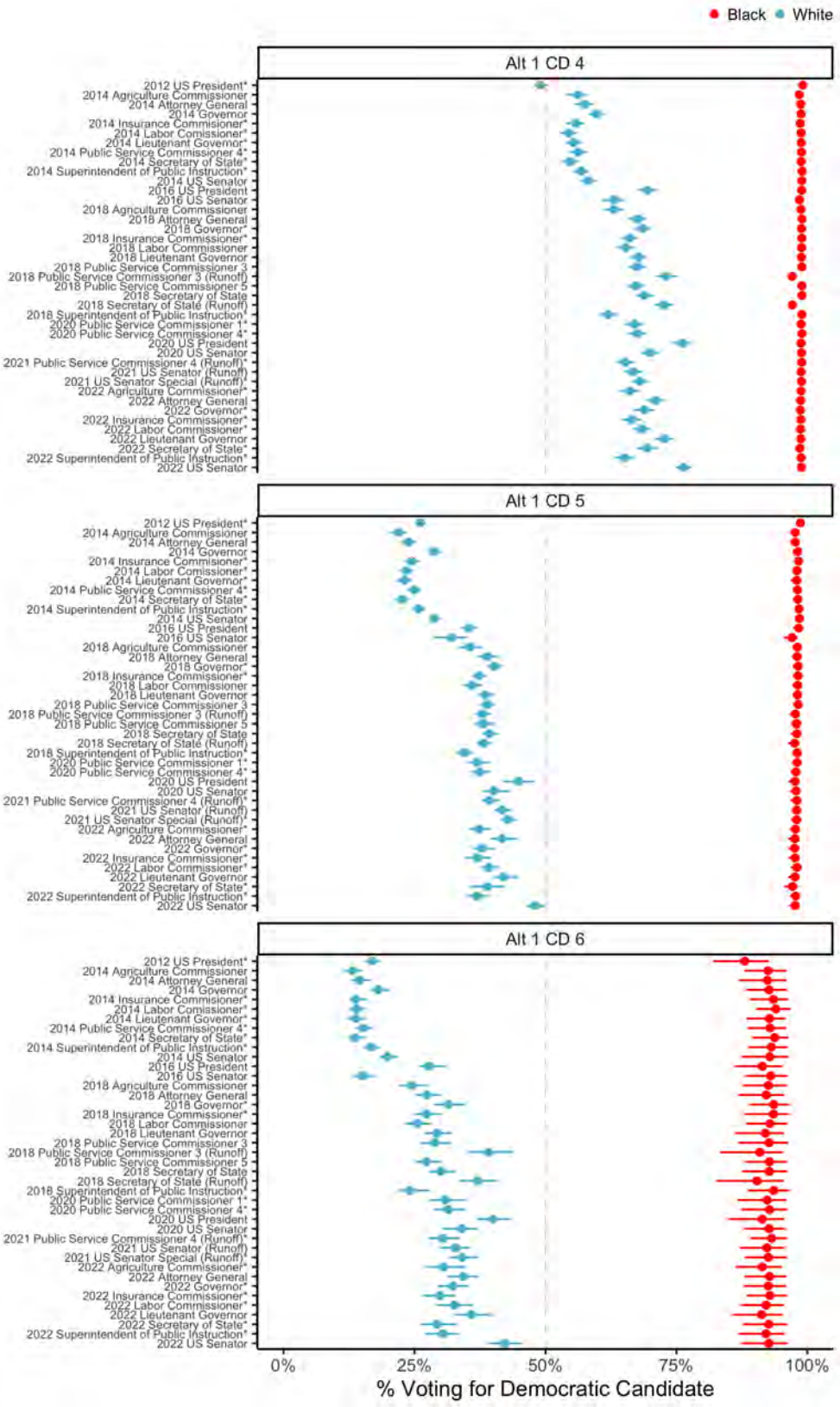

Figure 22: Ecological Inference Results — Illustrative Districts (Historical Elections, Two-Party Vote Shares)

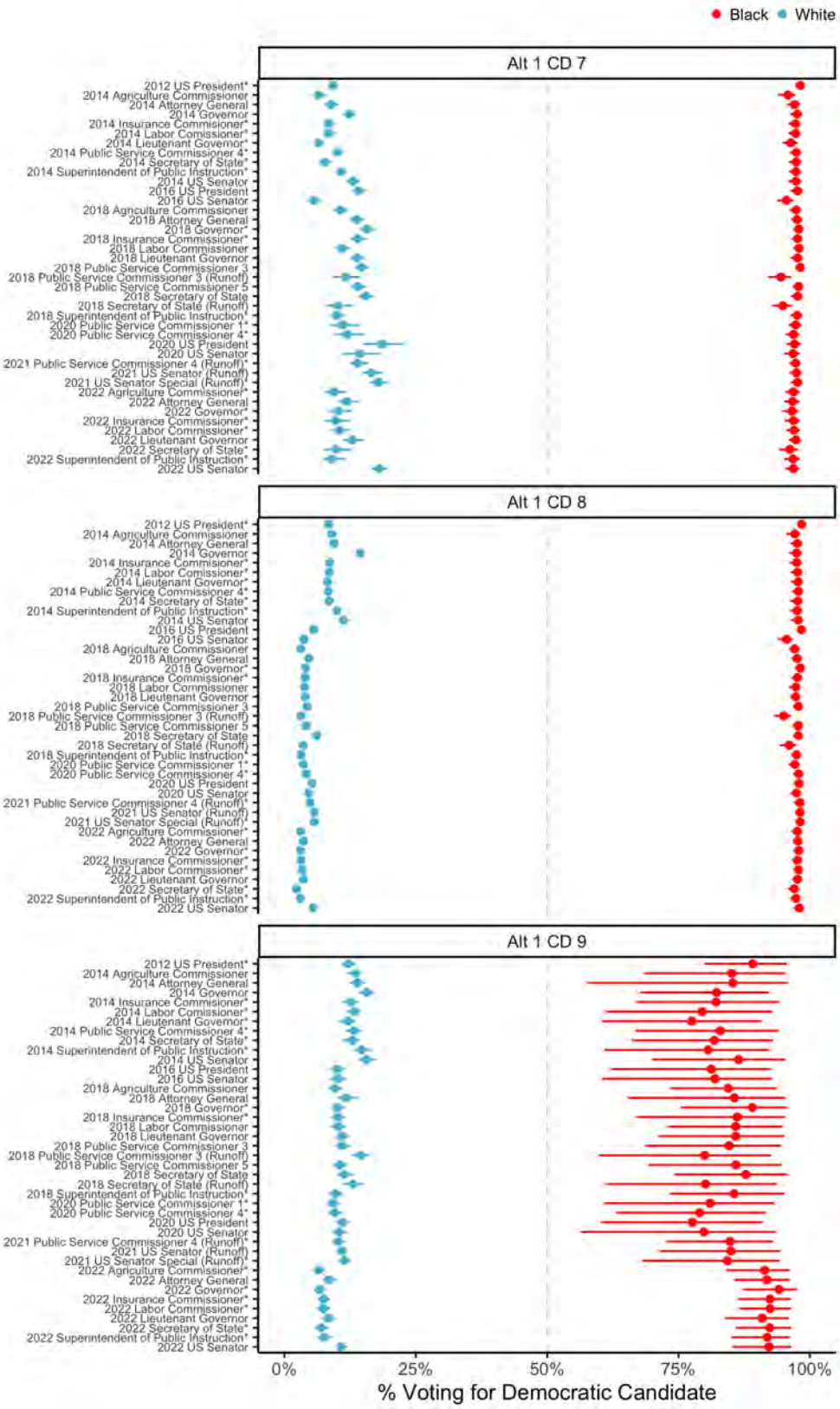

Figure 23: Ecological Inference Results — Illustrative Congressional Districts (Historical Elections, Two-Party Vote Shares)

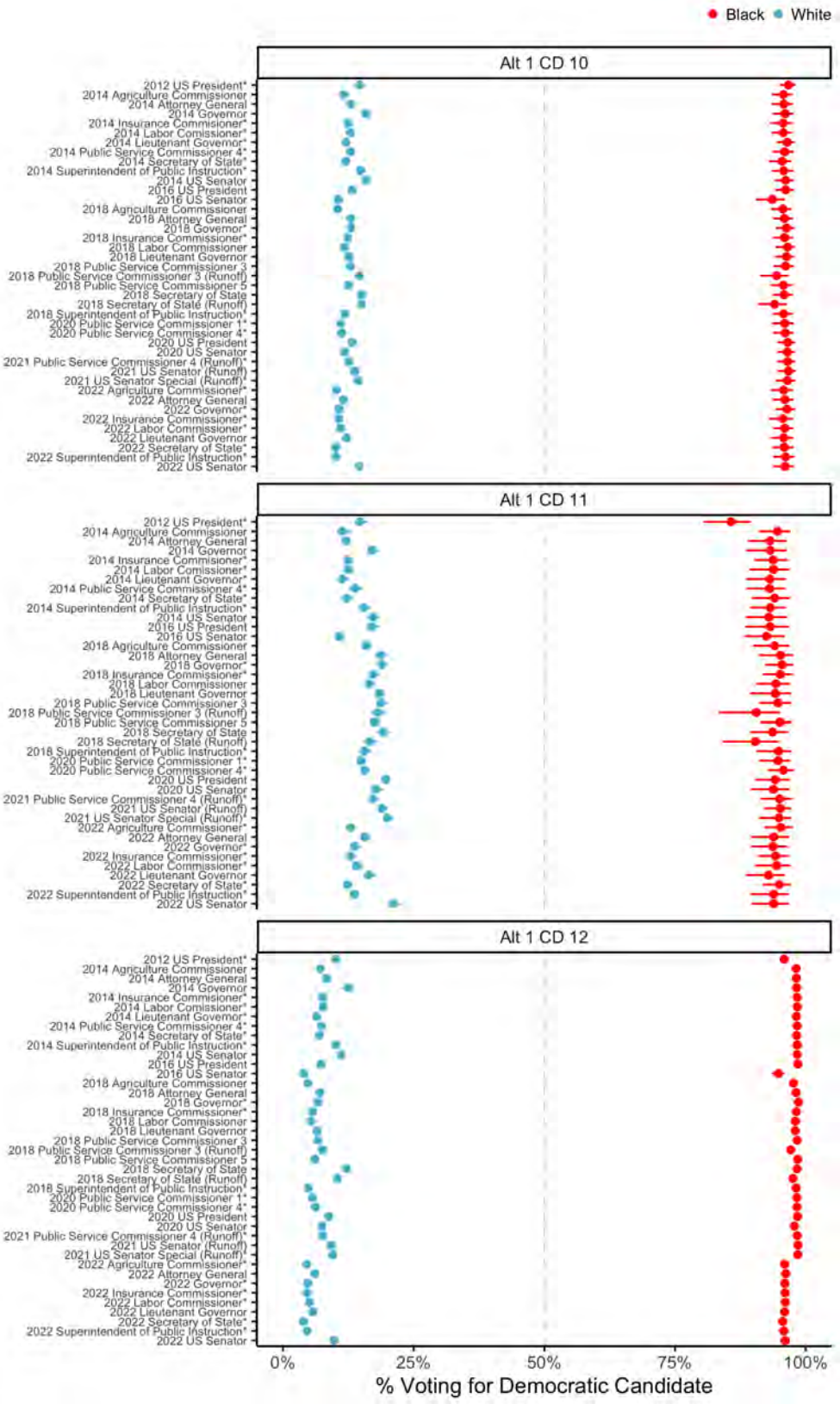

Figure 24: Ecological Inference Results — Illustrative Congressional Districts (Historical Elections, Two-Party Vote Shares)

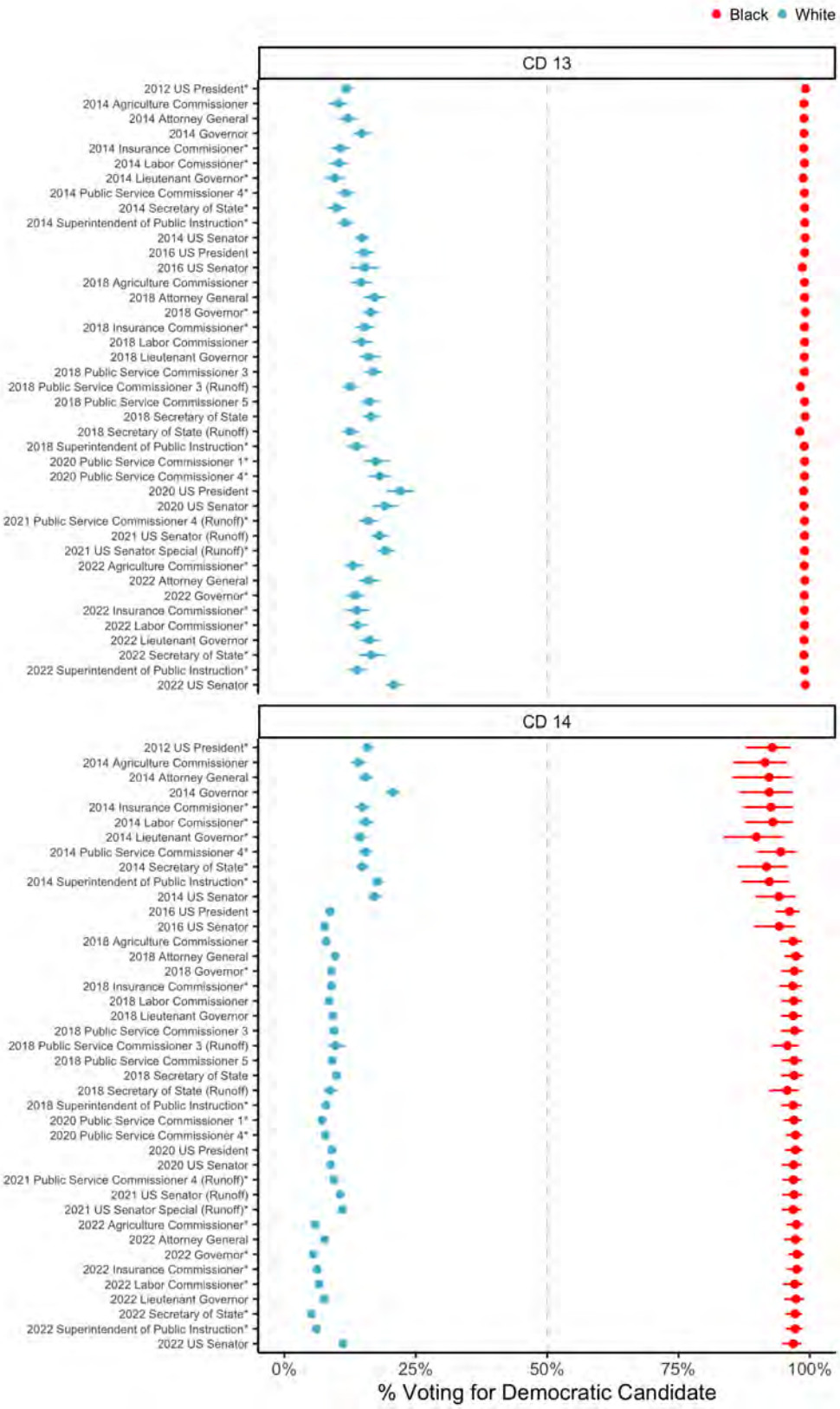

Figure 25: Ecological Inference Results — Illustrative Congressional Districts (Historical Elections, Two-Party Vote Shares)

State Senate Districts

72. I consider two Illustrative Maps of alternative State Senate Districts, and I apply the same methods of ecological inference as for the enacted map. Appendix Figures 33 and 34 depict the Illustrative State Senate maps, with the districts I have been instructed to focus upon highlighted.

73. I have been instructed to examine RPV for Black versus White voters in Illustrative Map 1 SDs 16, 17, 25, 28 and 40. I have been instructed to examine RPV for Black and Hispanic versus White voters in Illustrative Map 2 SDs 16 and 23.

74. Figure 26 reports the EI results for Illustrative State Senate Map 1, and Figure 27 reports the results for Illustrative State Senate Map 2.

75. For Map 1, I observe evidence of RPV between Black and White voters across all past statewide elections with a minority candidate running for SDs 16, 17, 25 and 28. In Illustrative Map 1 SD 40, I observe RPV 50% of the time in elections where a minority candidate ran. Furthermore, I observe evidence of RPV between Black and White voters in a majority (though not all) of elections with a minority-preferred candidate running.

76. For Map 2, I observe evidence of RPV with Black and Hispanic voters supporting minority candidates and White voters opposing them across all past statewide elections with a minority candidate running. When a minority candidate does not run, Black and Hispanic voters support the same minority-preferred candidate and White voters oppose this candidate.

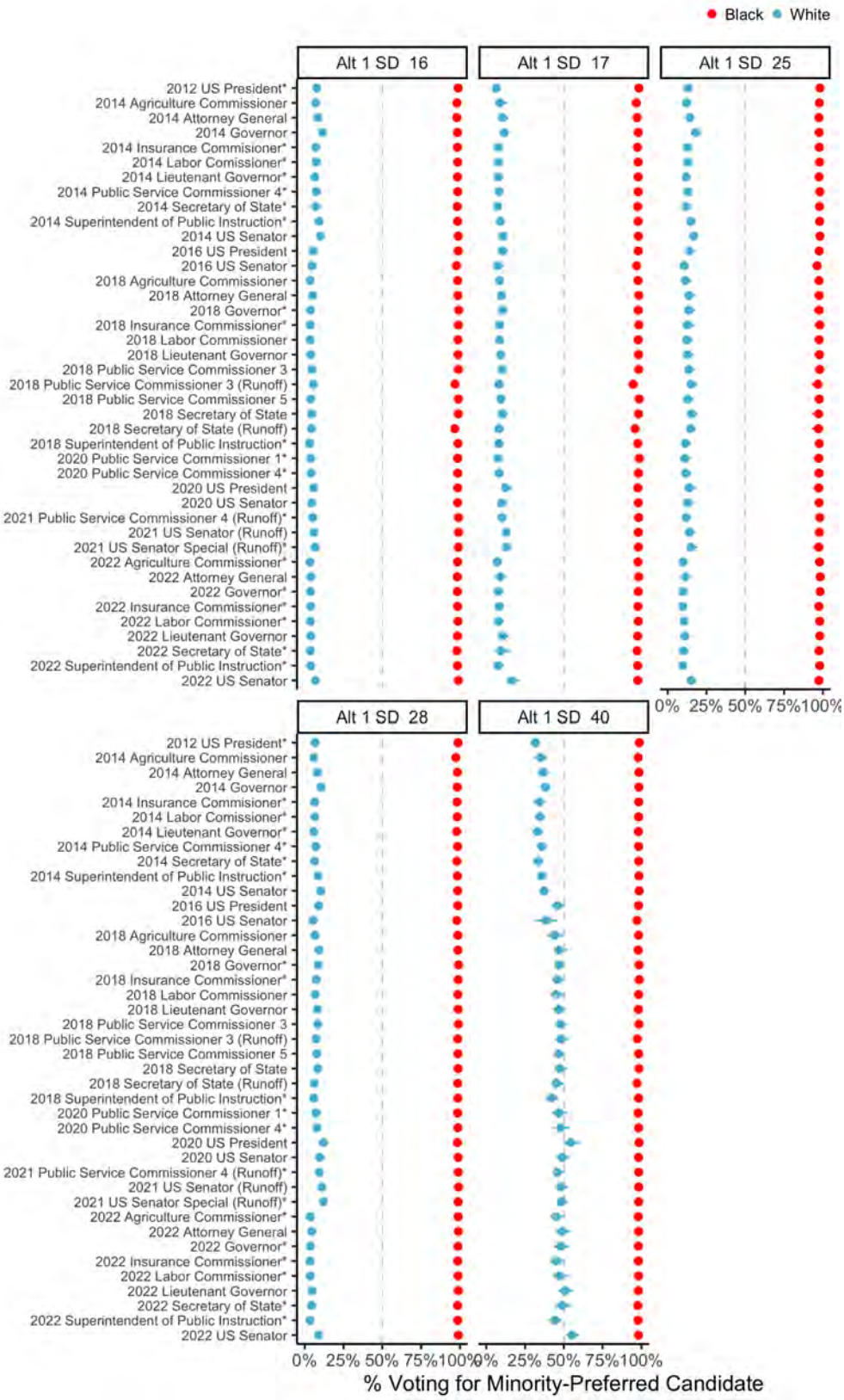

Figure 26: Ecological Inference Results — Illustrative Map 1 State Senate Districts (Historical Elections, Two-Party Vote Shares)

Figure 27: Ecological Inference Results — Illustrative Map 2 State Senate Districts (Historical Elections, Two-Party Vote Shares)

State House Districts

77. I also consider two Illustrative Maps of alternative State House Districts, and I apply the same methods of ecological inference as I did for the enacted map. Appendix Figures 35 and 36 depict the Illustrative State House maps, with the districts I have been instructed to focus upon highlighted.

78. I have been instructed to examine RPV for Black versus White voters in Illustrative Map 1 LDs 64, 74, 117, 144, 151 and 171 and for Black, Hispanic and White voters in Illustrative Map 1 LD 161. For Illustrative Map 2, I have been instructed to examine RPV for Black versus White voters in LDs 64, 117 and 144 and for Black, Hispanic and White voters in LD 161.

79. Figure 28 reports the results for Illustrative State House Map 1, and Figure 29 reports the results for Illustrative State House Map 2.

80. For Illustrative Map 1, I observe evidence of RPV between Black and White voters in all districts I have been asked to examine. Furthermore, in Illustrative Map 1 LD 161, where I also examine the behavior of Hispanic voters, I again observe RPV with Black and Hispanic voters supporting minority candidates and White voters opposing them.

81. For Illustrative Map 2, I again observe evidence of RPV between Black and White voters in all districts I examine. In LD 64, this occurs in every election. In LD 117, occasionally the confidence intervals on the estimates are wide enough to cross the 50% threshold but nonetheless, but even accounting for this Black voters support a minority candidate and White voters oppose them

in 95% of these elections. Similarly, in LD 144, Black voters support a minority candidate and White voters oppose them (with the confidence intervals on the estimates not overlapping with the 50% threshold) in 95% of such elections. Finally, in SD 161, I observe RPV with Black and Hispanic voters supporting a minority or minority-preferred candidate and White voters opposing them in all past elections that I study.

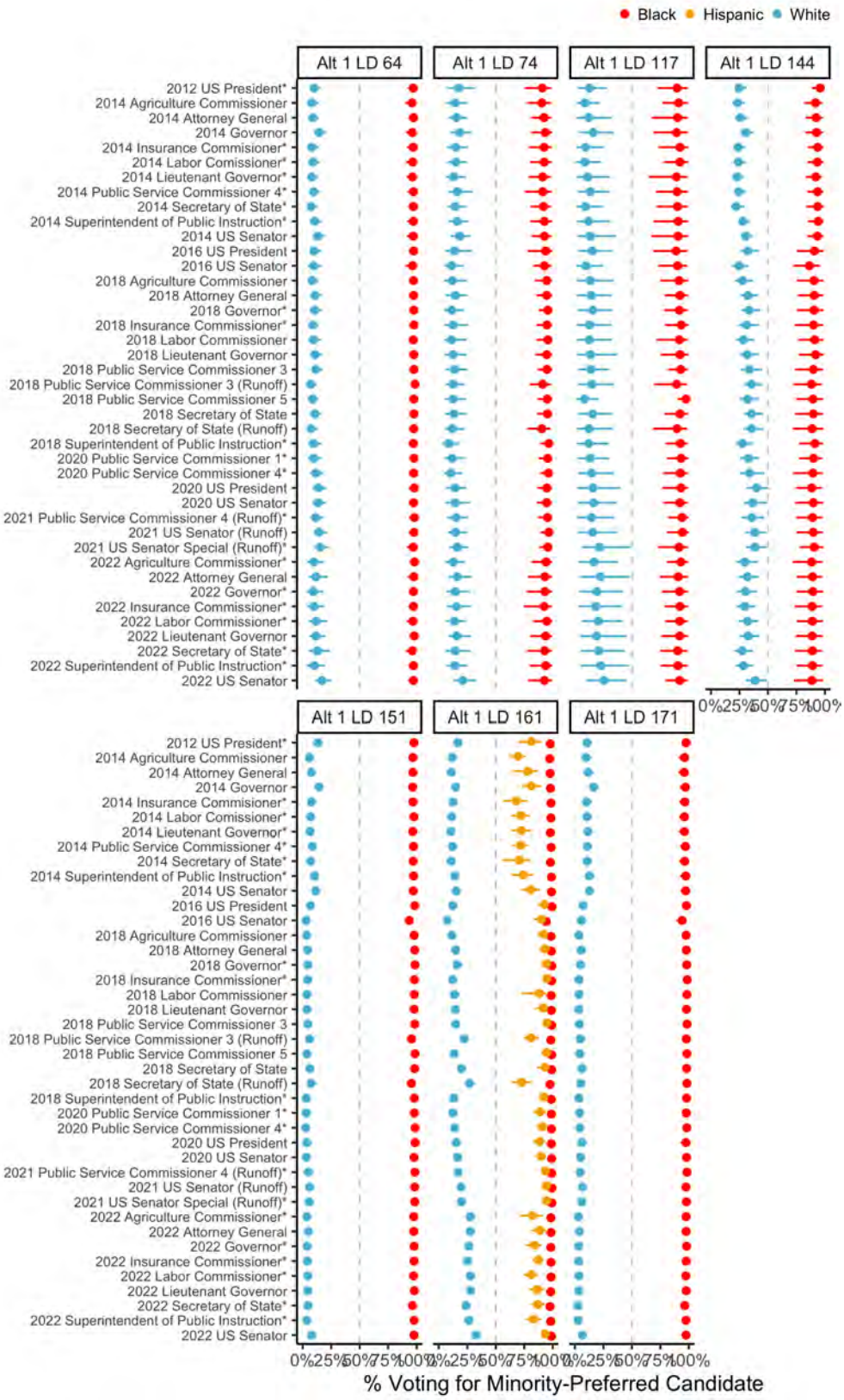

Figure 28: Ecological Inference Results — Illustrative Map 1 State House Districts (Historical Elections, Two-Party Vote Shares)

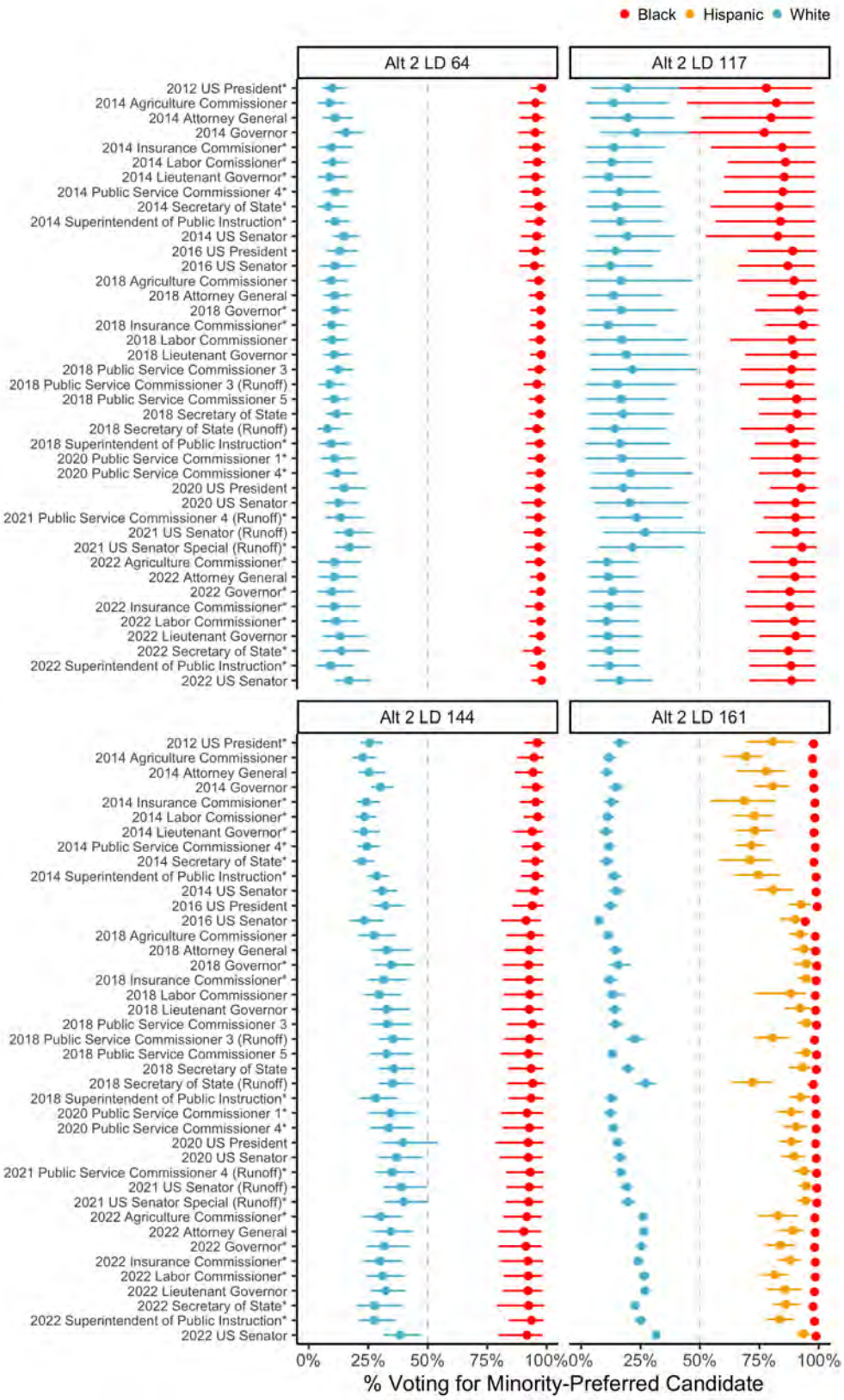

Figure 29: Ecological Inference Results — Illustrative Map 2 State House Districts (Historical Elections, Two-Party Vote Shares)

Performance Analysis of Illustrative Districts

82. I now turn to a performance analysis of the districts contained in the Illustrative Maps. To examine the performance of minority candidates in the Illustrative Maps, I examine the extent to which minority candidates have earned votes in past elections in the relevant districts. As before, I have determined the average vote share among minority candidates in each district, the minimum vote share earned by a minority candidate, the share of past elections a minority candidate won in each district, and the share of elections the minority candidate won safely (e.g., over 55% of the vote). I again draw upon the 20 statewide elections in which a racial minority candidate ran against a non-minority candidate since 2012. Table 10 in the Appendix denotes these elections with a star and reports the names of these candidates.

Congressional Districts

83. Table 5 presents the 2020 and 2022 share of the electorate for each minority group under consideration, along with the key summary statistics for district-wide electoral performance in the Illustrative congressional map.

84. Compared to the enacted map, there is one major difference and two slight differences. In the Illustrative Map, CD 3, which now reaches from the western part of the state into the Metro Atlanta area, becomes a district that performs in terms of the ability to elect minority candidates of choice. In the previous map, minority candidates never won an election in the district. In the

Illustrative Map, minority candidates now would have earned a majority in all past elections in which they ran.

85. Second, CDs 6 and 7 now provide a slightly stronger ability to elect minority candidates based on past elections. The share of past elections won by a minority candidate increased by 5% in CD 6 and by 15% in CD 7, compared to the enacted map. On the other hand, CDs 2 and 13 become more competitive, with CD 2 in particular now registering a safe victory for minority candidates in only a small share of past elections.

86. Overall, then, the Illustrative Map grants minority voters a very strong chance of electing preferred candidates in four of fourteen congressional districts (CDs 3, 4, 5 and 13). Minority voters still have a good chance of electing minority candidates in CDs 2 and 7, though with CD 2 considerably more competitive than in the enacted congressional map. Finally, based on historical elections, minority voters have a low chance of electing preferred candidates in the remaining congressional districts.

Table 5: Performance Analysis (Elections with a Minority Candidate), Illustrative Map CDs

CD	Black 2020	Black 2022	Hispanic 2020	Hispanic 2022	Mean M Vote	Min M Vote	M Wins	M Over 55%
1	25.8%	24.2%	2.0%	1.6%	42.0%	39.6%	0.0%	0.0%
2	42.6%	35.4%	1.3%	1.0%	50.1%	43.7%	70.0%	5.0%
3	43.9%	46.4%	2.2%	1.7%	58.7%	54.3%	100.0%	95.0%
4	45.0%	42.5%	2.4%	2.2%	80.7%	76.0%	100.0%	100.0%
5	45.2%	44.1%	4.1%	3.2%	71.0%	63.8%	100.0%	100.0%
6	11.1%	10.4%	3.9%	3.3%	42.0%	31.0%	5.0%	0.0%
7	34.8%	33.4%	8.3%	6.0%	57.8%	48.0%	80.0%	65.0%
8	21.5%	21.8%	1.5%	1.0%	30.4%	28.4%	0.0%	0.0%
9	2.8%	4.6%	3.3%	2.5%	19.8%	15.7%	0.0%	0.0%
10	14.0%	13.4%	2.6%	2.1%	30.9%	28.0%	0.0%	0.0%
11	14.0%	13.3%	3.2%	2.8%	34.0%	27.1%	0.0%	0.0%
12	34.8%	30.9%	1.6%	1.3%	44.5%	40.8%	0.0%	0.0%
13	47.2%	45.0%	2.2%	1.7%	56.8%	51.5%	100.0%	65.0%
14	5.5%	6.4%	3.8%	2.5%	23.5%	21.6%	0.0%	0.0%

Note: This table reports the share of the electorate, based on 2020 and 2022 turnout, of each minority racial group in a congressional district from the Illustrative Map along with the mean and minimum minority candidate vote share (labelled M) in the district across statewide elections with a minority candidate since 2012.

State Senate Districts

87. The tables below report the performance of the State Senate districts that I have analyzed under Illustrative Map 1 and 2. In Map 1, minority candidates win all past elections in SDs 16, 25, 28 and 40 and a strong majority of past elections in SDs 17. Several of these districts are relatively competitive, with the minority candidate winning by a narrow margin (e.g., less than 55%) at least a third of the time in SDs 17, 25 and 28.

88. In Map 2, minority candidates win all past elections in SD 16 and a majority of past elections in SD 23. Each district is relatively competitive, with the minority candidate earning less than 55% of the vote share 35% of the time in SD 16 and 80% of the time in SD 23.

89. To sum up, in the Illustrative State Senate Maps, minority-preferred candidates won more than half the time in every district I examine. This performance contrasts with the enacted Senate Districts I have examined, where minority candidates won more than half the time in 67% of districts.

Table 6: Performance Analysis (Elections with a Minority Candidate), Illustrative Map 1 SDs

SD	Black 2020	Black 2022	Hispanic 2020	Hispanic 2022	Mean M Vote	Min M Vote	M Wins	M Over 55%
16	45.2%	46.6%	1.9%	1.7%	56.4%	52.3%	100.0%	75.0%
17	44.1%	45.3%	2.6%	2.1%	57.8%	49.3%	90.0%	65.0%
25	43.0%	42.7%	1.3%	0.8%	53.4%	50.9%	100.0%	15.0%
28	43.5%	49.5%	2.3%	1.4%	58.8%	51.9%	100.0%	65.0%
40	49.4%	46.9%	3.9%	3.0%	75.6%	69.2%	100.0%	100.0%

Note: This table reports the share of the electorate, based on 2020 and 2022 turnout, of each minority racial group in a given Illustrave Map 1 State Senate district along with the mean and minimum minority candidate vote share (labelled M) in the district across statewide elections with a minority candidate since 2012.

Table 7: Performance Analysis (Elections with a Minority Candidate), Illustrative Map 2 SDs

SD	Black 2020	Black 2022	Hispanic 2020	Hispanic 2022	Mean M Vote	Min M Vote	M Wins	M Over 55%
16	44.1%	45.7%	1.9%	1.8%	55.4%	50.7%	100.0%	65.0%
23	45.7%	40.5%	0.9%	0.8%	52.4%	46.4%	70.0%	20.0%

Note: This table reports the share of the electorate, based on 2020 and 2022 turnout, of each minority racial group in a given Illustrave Map 2 State Senate district along with the mean and minimum minority candidate vote share (labelled M) in the district across statewide elections with a minority candidate since 2012.

State House Districts

90. The tables below report the performance of the State House districts that I have analyzed under Illustrative Map 1 and 2. In Map 1, minority candidates win all past elections in LDs 64, 144 and 161 and a majority of past elections in LDs 74, 117 and 151. Several of these districts are relatively competitive, with the minority candidate winning by a narrow margin (e.g., less than 55%) at least a third of the time in LDs 74, 117, 144 and 151. Finally, LD 171 offers some but by no means an overwhelming chance of electing minority candidates, as in this district minority candidates won 35% of past elections.

91. In Map 2, minority candidates win all past elections in LDs 64, 144 and 161. In LD 117, minority candidates won 35% of past elections.

92. To sum up, in each Illustrative State House Map, minority candidates won more than half the time in every district but one that I examine (86% and 75% of districts, respectively). This performance contrasts with the enacted House Districts I have examined, where minority candidates won more than half the time in 72% of districts.

93. I reserve the right to supplement this report if additional facts, testimony, and/or materials come to light. Pursuant to 28 U.S.C 1746, I declare under penalty of perjury that the foregoing is true and correct. Executed this 13th day of January, 2023 at 11:30pm.

Signature: Ben Schneer

Table 8: Performance Analysis (Elections with a Minority Candidate), Illustrative Map 1 LDs

LD	Black 2020	Black 2022	Hispanic 2020	Hispanic 2022	Mean M Vote	Min M Vote	M Wins	M Over 55%
64	46.7%	51.2%	2.4%	1.8%	60.3%	53.5%	100.0%	80.0%
74	43.9%	36.2%	2.5%	1.9%	52.9%	48.0%	75.0%	35.0%
117	44.9%	50.5%	3.0%	1.8%	55.5%	45.7%	65.0%	60.0%
144	37.7%	33.7%	1.2%	0.9%	53.6%	50.4%	100.0%	30.0%
151	51.8%	35.5%	1.3%	0.6%	51.5%	39.5%	70.0%	45.0%
161	43.0%	36.7%	3.2%	2.9%	62.0%	57.4%	100.0%	100.0%
171	42.1%	39.2%	0.9%	0.5%	48.0%	42.3%	35.0%	0.0%

Note: This table reports the share of the electorate, based on 2020 and 2022 turnout, of each minority racial group in a given State Senate district along with the mean and minimum minority candidate vote share (labelled M) in the district across statewide elections with a minority candidate since 2012.

Table 9: Performance Analysis (Elections with a Minority Candidate), Illustrative Map 2 LDs

LD	Black 2020	Black 2022	Hispanic 2020	Hispanic 2022	Mean M Vote	Min M Vote	M Wins	M Over 55%
64	46.1%	50.5%	2.6%	1.9%	59.8%	53.0%	100.0%	75.0%
117	45.1%	33.6%	2.9%	1.7%	49.3%	42.0%	35.0%	35.0%
144	43.1%	39.5%	1.2%	0.9%	58.2%	54.7%	100.0%	95.0%
161	42.2%	35.4%	3.0%	2.7%	60.5%	56.2%	100.0%	100.0%

Note: This table reports the share of the electorate, based on 2020 and 2022 turnout, of each minority racial group in a given State Senate district along with the mean and minimum minority candidate vote share (labelled M) in the district across statewide elections with a minority candidate since 2012.

Appendix A

Additional Tables

Table 10: Statewide Minority-Preferred Candidates

Year	Office	Candidate
2020	2020 Public Service Commissioner 1*	Robert Bryant
2020	2020 Public Service Commissioner 4*	Daniel Blackman
2020	2020 US President	Joe Biden
2020	2020 US Senator	Jon Ossof
2021	2021 Public Service Commissioner 4 (Runoff)*	Daniel Blackman
2021	2021 US Senator (Runoff)	Raphael Warnock
2021	2021 US Senator Special (Runoff)*	Raphael Warnock
2022	2022 US Senator	Raphael Warnock
2022	2022 Governor*	Stacey Abrams
2022	2022 Lieutenant Governor	Charlie Bailey
2022	2022 Secretary of State*	Bee Nguyen
2022	2022 Attorney General	Jen Jordan
2022	2022 Agriculture Commissioner*	Nakita Hemingway
2022	2022 Insurance Commissioner*	Janice Laws Robinson
2022	2022 Labor Commissioner*	William Boddie
2022	2022 Superintendent of Public Instruction*	Alisha Searcy

Note: This table reports the overall minority-preferred candidate based on statewide ecological estimates for the elections considered in this report. A star denotes those offices where a minority candidate is preferred to a non-minority candidate by minority voters statewide.

Table 11: Statewide Minority-Preferred Candidates, Continued

Year	Office	Candidate
2012	2012 US President*	Barack Obama
2014	2014 Agriculture Commissioner	Christopher Irvin
2014	2014 Attorney General	Greg Hecht
2014	2014 Governor	Jason Carter
2014	2014 Insurance Commisioner*	Liz Johnson
2014	2014 Labor Comissioner*	Robbin Shipp
2014	2014 Lieutenant Governor*	Connie Stokes
2014	2014 Public Service Commissioner 4*	Daniel Blackman
2014	2014 Superintendent of Public Instruction*	Valarie Wilson
2014	2014 Secretary of State*	Doreen Carter
2014	2014 US Senator	Michelle Nunn
2016	2016 US President	Hilary Clinton
2016	2016 US Senator	Jim Barksdale
2018	2018 Agriculture Commissioner	Fred Swann
2018	2018 Attorney General	Charlie Bailey
2018	2018 Governor*	Stacey Abrams
2018	2018 Insurance Commissioner*	Janice Laws Robinson
2018	2018 Labor Commissioner	Richard Keatley
2018	2018 Lieutenant Governor	Sarah Riggs Amico
2018	2018 Public Service Commissioner 3	Lindy Miller
2018	2018 Public Service Commissioner 3 (Runoff)	Lindy Miller
2018	2018 Public Service Commissioner 5	Dawn Rudolph
2018	2018 Superintendent of Public Instruction*	Otha Thornton
2018	2018 Secretary of State	John Barrow
2018	2018 Secretary of State (Runoff)	John Barrow

Note: This table reports the overall minority-preferred candidate based on statewide ecological estimates for the elections considered in this report. A star denotes those offices where a minority candidate is preferred to a non-minority candidate by minority voters statewide.

Additional Maps: Clusters

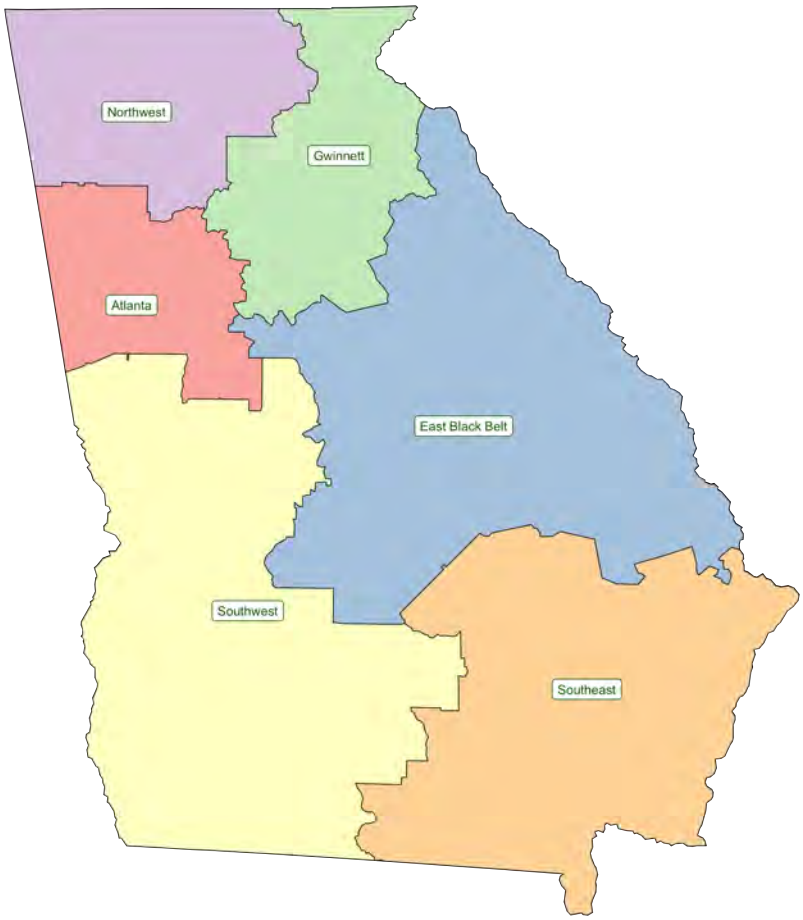

Figure 30: Map of State Senate Clusters

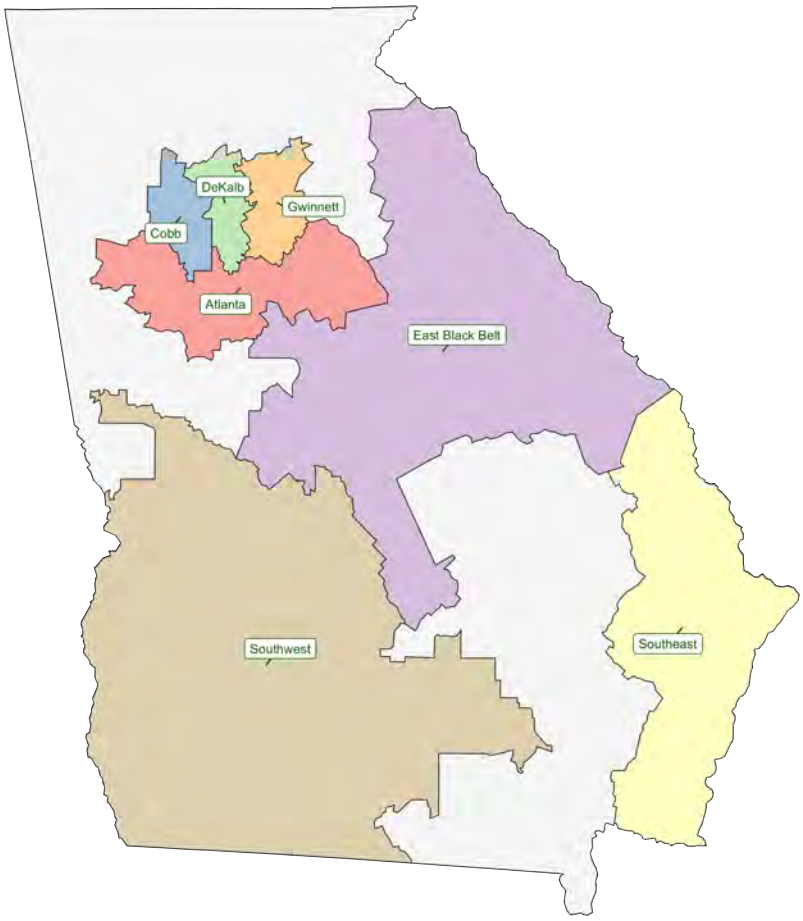

Figure 31: Map of State House Clusters

Additional Maps: Illustrative Congressional Districts

Figure 32: Map 1 of Illustrative State Senate Districts

Additional Maps: Illustrative State Senate Districts

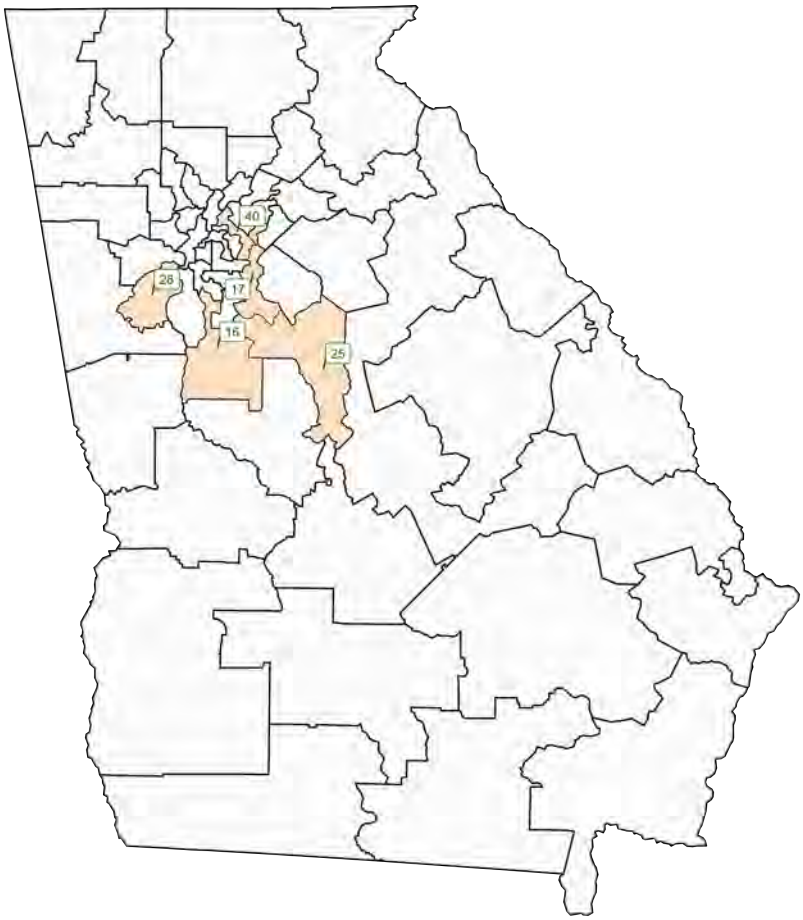

Figure 33: Map 1 of Illustrative State Senate Districts

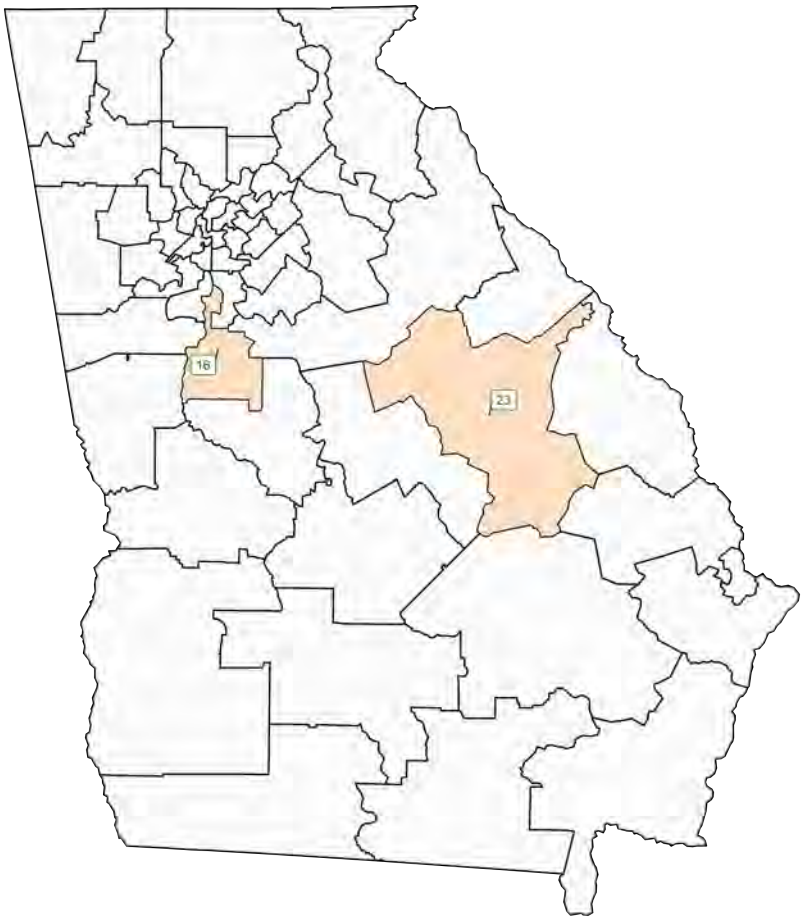

Figure 34: Map 2 of Illustrative State Senate Districts

Additional Maps: Illustrative State House Districts

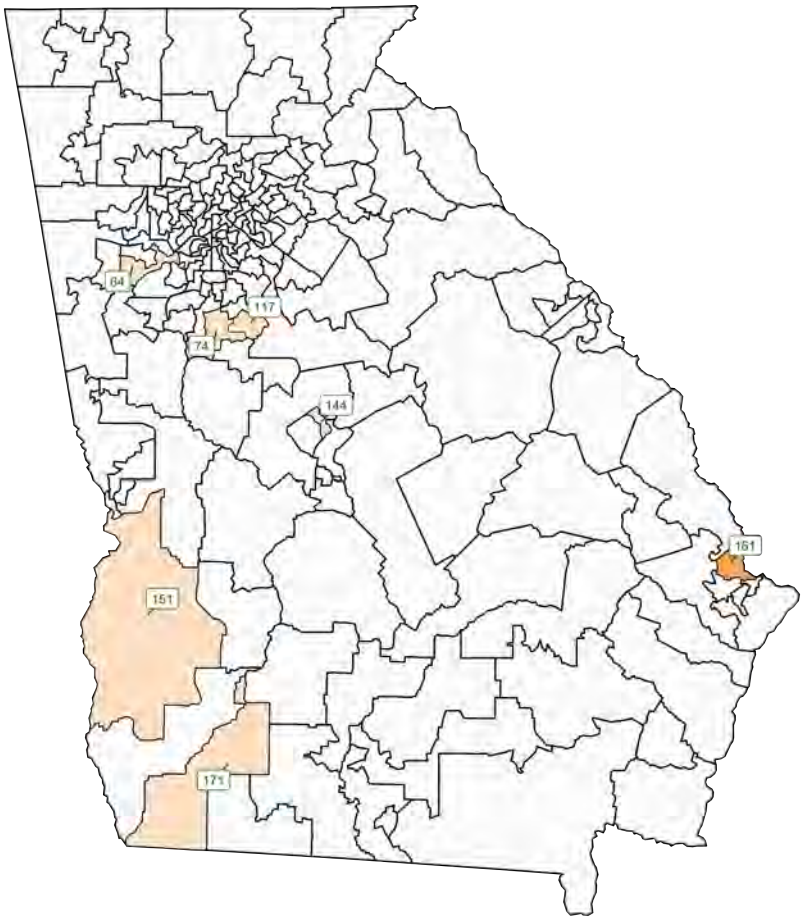

Figure 35: Map 1 of Illustrative State House Districts

Figure 36: Map 2 of Illustrative State House Districts

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Publications

"The Popular Origins of Legislative Jurisdictions: Petitions and Standing Committee Formation in Revolutionary Virginia and the Early U.S. House" (with Tobias Resch, Maggie McKinley, and Daniel Carpenter). 2022. *Journal of Politics* 84 (3): 1727–1745.

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"What Has Congress Done?" (with Stephen Ansolabehere and Maxwell Palmer). 2016. *Governing in a Polarized Age: Elections, Parties, and Political Representation in America*, eds. Alan S. Gerber and Eric Schickler. New York: Cambridge University Press.

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"When the Going Gets Tough, Members Go Home: Electoral Threat and Legislator Behavior in the U.S. Congress" (with Jaclyn Kaslovsky and Daniel J. Moskowitz).

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"A Partisan Solution to Partisan Gerrymandering: The Define-Combine Procedure" (with Maxwell Palmer and Kevin DeLuca). HKS Working Paper No. RWP22-012.

"Direct Election and Political Representation: Evidence from Congressional Petitioning."

"Bayesian Instrumental Variables Estimation with Relaxations of the Exclusion Restriction" (with Michael Gill and Arman Sabbaghi).

Current Projects

"Paywalls" (with Desmond Ang and Avinash Moorthy).

"Permanent Minority Rule? Uncovering the Limits of Partisan Gerrymandering" (with Maxwell Palmer).

"Coattail Effects and Candidate Quality" (with Kevin DeLuca and Dan Moskowitz).

"Misperceptions of Life Expectancy" (with Desmond Ang).

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"Drawing a Line." *Harvard Kennedy School Magazine*. Winter 2020.

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"The Arizona Redistricting Commission: One State's Model for Gerrymandering Reform" (with Colleen Mathis and Daniel J. Moskowitz). *Ash Center Policy Brief*, 2019.

"Are Divided Governments the Cause of Delays and Shutdowns?" *The Science of Politics (Podcast)*, January 2, 2019.

"Canvassers Tend to Seek Out Supporters Who Are Like Themselves, and That's Not Good for Political Participation" (with Daniel Carpenter and Clayton Nall). *LSE USAPP Blog*, November 1, 2017.

"How and Why Retired Politicians Get Lucrative Appointments on Corporate Boards" (with Maxwell Palmer). *The Washington Post (Monkey Cage)*, February 1, 2015.

"An Analysis of the Arizona Independent Redistricting Commission Congressional District Map" (with Gary King). *Submitted to Department of Justice*, 2012.

"An Analysis of the Arizona Independent Redistricting Commission Legislative District Map" (with Gary King). *Submitted to Department of Justice*, 2012.

Conferences & Presentations

2022: Georgia State University (Economics), HKS Faculty Lunch Seminar, Harris School (University of Chicago CEG American Politics Conference), APSA

2021: Redistricting Algorithms, Law, and Policy (Radcliffe Institute), Metro Cities Council of the American Chamber of Commerce Executives, APSA

2020: HKS Faculty Lunch Seminar

2019: MPSA, Congress & History

2018: FSU (Colloquium), Congress & History, APSA

2017: Congress & History

2016: PolNet, APSA

2015: The Media Consortium, Boston University (Emerging Media Studies), MPSA, Iowa State, APSA, Harvard (Grad PE, APRW)

2014: SPSA, Texas A&M, The Media Consortium, Radcliffe (The Petition in North America), MPSA, Harvard (APRW x2, Grad PE, PE), NYU (Alexander Hamilton Center for Political Economy), PolMeth (Poster Session), APSA, Tobin Project

2013: Harvard (Grad PE), MPSA, The Media Consortium

2012: Harvard (APRW)

2011: Harvard (APRW)

Teaching

API 202: Empirical Methods II, Harvard Kennedy School, Spring 2022 & Spring 2023.

DPI 610: Data Science for Politics, Harvard Kennedy School, Spring 2020 & Spring 2021.

DPI 308: Translating Public Opinion into Policy Action, Harvard Kennedy School, Spring 2019, Fall 2020 & Spring 2021.

Forecasting Elections in 2020 (Summer Engagement Session), Harvard Kennedy School, Summer 2020.

POS 3263: Political Elites and Representation, Florida State University, Spring 2018.

POS 4424: Legislative Systems, Florida State University, Spring 2017, Fall 2017 & Spring 2018.

POS 5427: Legislative Politics, Florida State University, Spring 2017.

POS 5045: National Government (American Politics Core), Florida State University, Fall 2017.

Gov 30: American Government, Professor Paul E. Peterson, Harvard University, Fall 2013 (TF).

Gov 1300: The Politics of Congress, Professor Stephen Ansolabehere, Harvard University, Spring 2013 (TF).

Gov 1359: The Road to the White House, Carlos Diaz Rosillo, Harvard University, Fall 2012 (TF).

Econ 101: Economic Policy Analysis, Anamaria Pieschacon, Stanford University, Fall 2009 & Winter 2010 (TA).

Past Employment

Research Assistant, Professor Gary King, Harvard University, 2011–2016.

Research Assistant, Professor Daniel Carpenter, Harvard University, 2011–2014.

Research Assistant, Professor Gavin Wright, Stanford University, 2008–2009.

Research Analyst, LECG LLC, 2006–2007.

Research Fellow, Professor Alison Morantz, Stanford Law School 2005–2006, 2010.

Fellowships & Awards

American Journal of Political Science Best Paper Award (co-winner) for "Paths of Recruitment: Rational Social Prospecting in Petition Canvassing," 2018.

Summer Institute, Center for Advanced Study in the Behavioral Sciences, 2017.

First Year Assistant Professor Grant, Florida State University, 2017.

Richard J. Herrnstein Prize, awarded by the Harvard Graduate School of Arts and Sciences for "a dissertation that exhibits excellent scholarship, originality and breadth of thought, and a commitment to intellectual independence," 2016.

GSAS Dissertation Completion Fellowship, Harvard University, 2015–2016.

Term Time Merit Fellowship, Graduate Society, Harvard University, 2014–2015.

Dissertation Research Fellowship for Study of the American Republic, Center for American Political Studies, Harvard University, 2014–2015.

Jeanne Humphrey Block Dissertation Award, Institute for Quantitative Social Sciences, Harvard University, 2014–2015.

Graduate Research Grant, Institute for Quantitative Social Sciences, Harvard University, 2014–2015.

Fellow, Democracy & Markets, Tobin Project, 2014–2015.

Graduate Fellowship, Harvard University, 2010–2016.

NSF Travel Grant, Annual Conference of the Society for Political Methodology, 2014

Travel Grant, Institute for Quantitative Social Science, Harvard University, 2013, 2014, 2015.

Outstanding Teaching Assistant, Stanford University, 2009–2010.

Phi Beta Kappa, 2005.

Dean's List, Columbia University, 2001–2005.

Other

Affiliations

Taubman Center for State and Local Government, Harvard Kennedy School

Ash Center for Democratic Governance and Innovation, Harvard Kennedy School

Institute for Quantitative Social Science, Harvard University

Center for American Political Studies (CAPS), Harvard University

Multidisciplinary Program in Inequality and Social Policy, Harvard University

Political Analysis Track, Ph.D. Program in Health Policy, Harvard University

Service

Co-Organizer, American Politics Speaker Series, Harvard Kennedy School and Department of Government, 2019–Present.

DPI Junior American Politics Search Committee, Harvard Kennedy School, 2019–2020.

Host, Faculty Research Seminar, Harvard Kennedy School, 2019, 2021.

MPP Admissions Committee, Harvard Kennedy School, 2018–2019.

PhD Admissions Committee, Institutions and Politics Track, Harvard Kennedy School, 2021–2022.

Selected Consulting

Virginia Redistricting Commission (Voter Polarization Analysis, 2020s Redistricting Cycle)

Arizona Independent Redistricting Commission (2010s Redistricting Cycle)

New York Civil Liberties Union (*Hurrell-Harring et al. v. the State of New York*)

Other Projects/Cases: Illinois State Legislature (Redistricting), Texas (Voter ID)

Software Packages

R, Stata, SAS, Python, ArcGIS, LaTeX.