Assessing District Elections as a Remedy in State Voting Rights Acts

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Abstract

As federal voting rights protections recede, state-level voting rights acts (VRAs) have become the principal legal tool for safeguarding minority representation in the United States. We assess what these laws can accomplish using the California Voting Rights Act, which has compelled over 150 cities to replace at-large with district elections. Applying redistricting algorithms across 109 cities, we evaluate how much district elections—and the alternative reforms state VRAs permit—can amplify Latino political influence. District elections prove to be a limited remedy: most cities cannot draw a majority-Latino district and many cannot use districts to meaningfully increase Latino electoral success, even under optimistic assumptions about turnout, cohesion, and crossover voting. By contrast, cumulative voting, ranked choice voting, and limited voting empower Latino voters without relying on favorable geography or mapmakers' discretion. We conclude that policymakers seeking to improve minority representation should be more open to reforms within the proportional representation family.

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Introduction

The Voting Rights Act of 1965 (VRA) long stood as the federal government's most powerful tool for protecting minority political representation in the United States. However, a series of recent Supreme Court decisions has eroded its enforcement capacity (Greenwood and Stephanopoulos 2023). Most recently, in *Louisiana v. Callais* (2026), the Court severely restricted the drawing of majority-minority districts, requiring proof that the state "intentionally drew its districts to afford minority voters less opportunity because of their race" (Supreme Court of the United States 2026). Legal scholars argue that the ruling has effectively ended the VRA's core protections (Hasen 2025), which extended from Congress to school boards.

To counteract a hamstrung VRA, 23 states have drafted or passed voting rights acts of their own, designed to replicate or expand upon the federal statute. We evaluate the capacity of these laws to fill the void left by federal retrenchment. When federal courts find fault with an electoral rule for diluting minority political power, they typically impose a specific remedy. By contrast, state VRAs leave implementation of the remedy to local jurisdictions, bounded only by broad legal standards. What states can accomplish therefore turns on what localities do with their discretion: specifically, how racial demographics, political behavior, and geography shape the remedies cities adopt, and how much those remedies can advance minority political influence.

We evaluate state VRA capacity by examining the California Voting Rights Act (CVRA) of 2001, the first law of its kind and the model for many since. The CVRA lowered the federal evidentiary standard for showing that at-large local elections dilute minority voting power, making it easier for plaintiffs to challenge them in court. It has since pushed hundreds of municipalities and school districts to replace at-large with district elections (Abott and Magazinnik 2020; Collingwood and Long 2019). As other states adopt their own VRAs, California offers the clearest available evidence on what such laws can and cannot accomplish.

We first study the effectiveness of the CVRA's principal remedy: district elections for local legislative office, historically the most common response to Section 2 challenges nationwide. We measure the reform's success using two outcomes: the number of majority-Latino districts and the expected Latino share of the city council, the latter modeled under a range of assumptions about racial crossover, racial cohesion, and the Latino–non-Latino turnout gap (Atsusaka 2021).[1] We begin by collecting the first district maps adopted under the CVRA for 109 cities.[2] We then use state-of-the-art districting algorithms to characterize the distribution of both outcomes across a representative sample of race-neutral counterfactual plans, along with the extreme values attainable by explicit optimization for those outcomes (McCartan and Imai 2023; Cannon et al. 2023). This lets us trace what district elections could deliver in each city and judge each adopted map against that benchmark.

Despite the historic popularity of districting as a remedy, some voting rights advocates have grown skeptical that district elections deliver meaningful gains in political power for minority voters. The ACLU of California, for example, has warned that switching to district elections is no panacea for Latino representation, pointing instead to three alternatives: limited voting, cumulative voting, and single transferable vote (STV) ranked choice voting (ACLU of Southern California 2025). The same three reforms appear in NAACP Legal Defense Fund model legislation (NAACP Legal Defense and Educational Fund 2026). Using parallel assumptions about racial crossover, racial cohesion, and the turnout gap, we simulate synthetic ballots for Latino and non-Latino candidates (Benade et al. 2021; MGGG Redistricting Lab 2025) and estimate the expected effect of each alternative reform on Latino representation.

We present four key findings. First, political geography and demographics severely limit what district elections can accomplish. Even in simulations explicitly designed to maximize the number of Latino-majority districts, 61% of the 109 cities in our sample cannot draw a single district with a majority-Latino citizen voting-age population (CVAP). This constraint helps explain why district elections have been found to improve minority representation only in jurisdictions with large and residentially segregated minority populations (Abott and Magazinnik 2020; Collingwood and Long 2019; Dancygier 2014; Trounstine and Valdini 2008). Looking at expected electoral outcomes tells the same story. In 50% of our cities, no feasible map would be predicted to place a single Latino candidate on the council. The CVRA's relaxed evidentiary standard, in short, has brought district elections to many cities where the reform is unlikely to have a meaningful impact.

[1] Although the CVRA has been used to advance the representation of both Latino and Asian American voters, Latinos are the modal minority group in California cities.

[2] Appendix Table A-1 lists California cities that have adopted district elections and identifies those in our sample. Appendix Tables A-2 and A-3 summarize their demographic composition.

Second, within the half of the sample where maps do vary in our outcomes of interest, city councils tended to choose favorable ones. Of this subset, 51% of cities adopted plans above the 90th percentile of the simulation distribution of expected Latino council share, and 18% adopted the most favorable plan in the simulation distribution. This may reflect the high-profile nature of CVRA districting: maps were debated in public hearings and adopted in open votes under activist and state scrutiny.

Third, the limitations of district elections persist even under optimistic assumptions about political behavior. Researchers have described the switch to district elections as a mobilizing event that narrows racial turnout disparities (Hertz 2023). Yet even if the turnout gap between Latino and non-Latino voters were to close entirely, district elections would only meaningfully increase the expected Latino share of the city council in 35 of the 109 cities in our sample. Favorable assumptions about Latino cohesion and non-Latino crossover voting fare no better. The limits of district elections are structural, not behavioral.

Finally, we find that limited voting, cumulative voting, and STV ranked choice voting show far more promise for minority descriptive representation. Across a range of simulation tools (Benade et al. 2021; MGGG Redistricting Lab 2025) and behavioral assumptions, all three yield higher expected Latino council shares than districts, on average, by making more efficient use of every vote cast for a Latino candidate.

Our work contributes to a growing body of research on state voting rights regimes and their capacity to fill the vacuum left by federal retrenchment. District elections emerge as the most limited remedy, hampered by geography and vulnerable to the preferences of local decisionmakers. The other remedies we study, by contrast, fulfill the representational goals of state VRAs, do not depend on local discretion and geography, and come with fewer trade-offs with other policy objectives (e.g., Hankinson and Magazinnik 2023; Mast 2024). Because every state VRA passed or introduced to date permits these alternatives or leaves open the possibility that they may be implemented, advocates for minority descriptive representation should be more open to reforms within the proportional representation family.[3]

[3] Strictly speaking, only STV is a fully proportional system. Limited and cumulative voting are often classified as semi-proportional: they permit cohesive minorities to convert votes into seats more efficiently than winner-take-all rules, but they do not guarantee proportionality and their performance depends on coordination among voters and candidates (Lijphart, Pintor and Sone 1986; Cox 1997). For brevity, we refer to these reforms collectively as proportional-family remedies.

How State VRAs Aim to Increase Minority Descriptive Representation

The federal VRA advances voting rights through two mechanisms: Section 5's preclearance requirement and Section 2's prohibition on electoral institutions that limit voting rights on the basis of race. Since *Thornburg v. Gingles* (1986), Section 2 claims have rested on a three-pronged test: the minority group must be (1) sufficiently large and geographically compact to constitute a majority in a single-member district, (2) must be politically cohesive, and (3) must vote sufficiently as a bloc to routinely defeat the majority group's preferred candidate (Supreme Court of the United States 1986).

State VRAs expand on the federal statute chiefly by eliminating the first prong. Doing so not only widens the set of targetable jurisdictions beyond those with large, geographically segregated minority populations, but also opens the door to electoral remedies beyond district elections (Greenwood and Stephanopoulos 2023). Of the 23 states that have passed or introduced their own VRA, 16 explicitly name electoral remedies (Appendix Table B-4). All 16 include district elections, underscoring their status as the default remedy. Most of these 16 explicitly endorse proportional reforms, while the remainder make clear that they do not limit remedies to district elections. Of the 7 states that do not explicitly name an electoral reform, 6 use language like "a new electoral system" and "appropriate remedies" that accommodates a broad set of options including proportional reforms. The seventh state, Arizona, offers a non-exclusive list of remedies to voter dilution, but does not mention changing the method of election. In short, of the 22 state VRAs that address structural electoral reform, each permits, either explicitly or implicitly, institutions beyond district elections.

Despite the apparent openness of state VRAs to alternative institutions, district elections have been the favored remedy to a Section 2 challenge. The logic is simple: under racially polarized voting, a citywide majority bloc can capture every seat in at-large elections. Single-member districts, by contrast, enable the creation of at least one majority-minority district in which the minority bloc has sufficient size to elect its candidate of choice. However, district elections face four constraints in increasing minority descriptive representation. First, the city's minority population must be sufficiently large and spatially clustered for a majority-minority district to be possible. If the minority population is evenly distributed, no district can exceed the citywide minority share. Thus, relaxing *Gingles*'s first prong enables state VRA challenges precisely in the cities where district elections are unlikely to translate into more seats for the minority group.

Second, voters vary in their support for candidates within (cohesion) and outside of (crossover) their own racial or ethnic group. White Democrats, for example, are increasingly willing to support non-white candidates (Mikkelborg 2025), and such crossover can propel non-white candidates to office even absent a local racial majority. Latinos, meanwhile, have shown declining cohesion in their support for the Democratic Party (Fraga, Velez and West 2025), which may portend declining racial cohesion as a voting bloc. Given crossover and cohesion, a majority-minority district may be neither necessary nor sufficient for minority descriptive representation.

Third, the majority–minority turnout gap conditions the minority-population threshold a district must clear to create meaningful opportunities for minority candidates (Fraga 2018). If the minority group votes at lower rates than the majority, even a highly cohesive minority-majority may fail to secure descriptive representation. A large literature has accordingly sought to identify the CVAP threshold required to elect a "candidate of choice" (e.g., Atsusaka 2021; Cameron, Epstein and O'Halloran 1996; Lublin 1997; Lublin et al. 2020).

Fourth, district elections require the selection of a map that advances the state VRA's goals, but mapmakers' incentives need not match the statute's objectives. A districting plan may crack or pack minority voters, but it can blunt the reform even without racial gerrymandering. In implementing the CVRA, cities have preferred maps that give each incumbent a district of their own, avoiding contests between sitting councilors (Loffredo, Hankinson and Magazinnik 2026). This incumbency protection limits minority candidate entry and electoral success.

In contrast to district elections, the alternative systems we investigate all elect multiple members from the city at large. Under *cumulative voting*, voters receive as many votes as there are open seats and may allocate them however they choose: in a five-seat election, a voter may give all five votes to one candidate or split them among several, and the top five vote-getters win. *Limited voting* works similarly, but voters receive fewer votes than there are open seats—perhaps two votes in a five-seat election—and, as usually implemented in practice, can only give one vote per candidate. The *single transferable vote* differs from the first two because it is a form of ranked choice voting. Voters rank the candidates, and counting proceeds in rounds. The first round considers voters' top-ranked choices, and any candidates who reach a quota are elected.[4] If no candidate has reached the quota and there are more candidates than unfilled seats, the candidate with the fewest current votes is eliminated. In either case, the affected ballots transfer to voters' next-ranked remaining choice: votes for elected candidates beyond the quota in the first case, or all votes for the eliminated candidate in the second case. This process repeats until all seats are filled.

All three systems are relevant options for state VRAs. Cumulative voting has been adopted in Texas, where state courts prescribed it in a series of cases brought on behalf of Latino voters by the League of United Latin American Citizens (LULAC) (Nichols 2002). Limited voting has been used for local elections in Alabama, Connecticut, Pennsylvania, and North Carolina in response to VRA litigation (U.S. Election Assistance Commission 2023). Six California cities use or have used ranked choice voting for city council elections (Ranked Choice Voting Resource Center 2026)—Albany, Berkeley, Oakland, Palm Desert, San Francisco, and San Leandro—and in 2026 Los Angeles announced that it is considering the reform (Gomez 2026).

The California Voting Rights Act

To unpack how district elections shape descriptive representation, we leverage the implementation of the California Voting Rights Act of 2001. The law was designed to ease plaintiffs' path to challenging at-large elections for disadvantaging Latino electorates. Whereas the *Gingles* test requires that a city be able to draw at least one majority-minority district before a court can compel district elections, the CVRA requires only that plaintiffs show evidence of "racially polarized voting." The law has brought district elections to over 160 city councils, with wide variation in segregation, demographic composition, and political geography among adopters. Many cities seemingly switch voluntarily, but the threat of the law looms over every such choice: every city that has challenged a CVRA claimant in court has lost, some accumulating millions of dollars in legal fees (Schuk 2015). Even a law firm's threat letter may require reimbursing roughly $30,000 in research costs and starts a clock compelling fast action. Municipalities that see themselves as likely targets therefore have strong incentives to act preemptively.

Once a city commits to switching, the mapmaking process begins. CVRA districting has pro-

[4] The quota is typically just over $\frac{1}{S+1}$ of the ballots in an S-seat election, known as the *Droop quota*.

ceeded largely without the advanced methods now deployed in state and federal redistricting, suggesting much to learn from modern computational tools. Typically, the city council hires a demographer to advise on map design and help community members submit their own proposals. The demographer may also work with a "citizens' committee" charged with distilling public input into a single recommended map. Eventually, the council votes to select a final plan.

Councils face both internal and external constraints on the plans they can feasibly draw. Internally, a city is limited by its shape and electoral geography (e.g., Chen and Rodden 2013). Externally, the plan must comport with federal standards or risk litigation under the federal VRA: districts should be roughly equal in population, relatively compact, and contiguous. These constraints interact. A city with an irregular shape, for example, may be structurally unable to divide certain communities between districts while satisfying the contiguity, compactness, and equal-population requirements—a situation we illustrate with the following example.

The Mapmaking Process: Evidence from Anaheim

The challenges of engineering descriptive representation through districts are well illustrated by Anaheim, a city of approximately 350,000 people outside Los Angeles. With Latinos comprising 53% of its population and 35% of its citizen voting-age population, Anaheim was an ideal target for CVRA litigation, and adopted district elections in response to a 2014 lawsuit filed by the ACLU.

To manage the transition, the city council formed a citizens' committee led by five retired judges. The committee proposed the "People's Map," with six districts: one majority-Latino CVAP district and two others where Latinos constituted a sizable minority of around 45% (Elmahrek 2015). Despite broad public support, the council initially voted 3–2 against the People's Map. Leading the opposition, Councilmember Jordan Brandman argued that it failed to maximize Latino representation, potentially exposing the city to future CVRA litigation; he favored an alternative with two majority-Latino districts. The People's Map was ultimately adopted (Elmahrek 2016), but the council remained uneasy. New census data showed the lone majority-Latino district slipping to 49% Latino CVAP (Diamond 2016). The city's demographer offered assurances that, given the margin of error, the dip was unlikely to reflect a real change in the underlying electoral geography, but the fixation on the 50% threshold underscored how much it matters to some stakeholders.

Anaheim's debate was possible only because a sizable Latino population, coupled with residential segregation, gave the city a meaningful choice: as we show in our later analyses, Anaheim could draw anywhere from zero to two majority-Latino districts. Figure 1 illustrates this point. The top panel shows the People's Map, with three districts where Latinos form a sizable minority. The bottom shows a counterfactual map, similar in spirit to Brandman's proposal, that maximizes the number of majority-Latino districts at two.

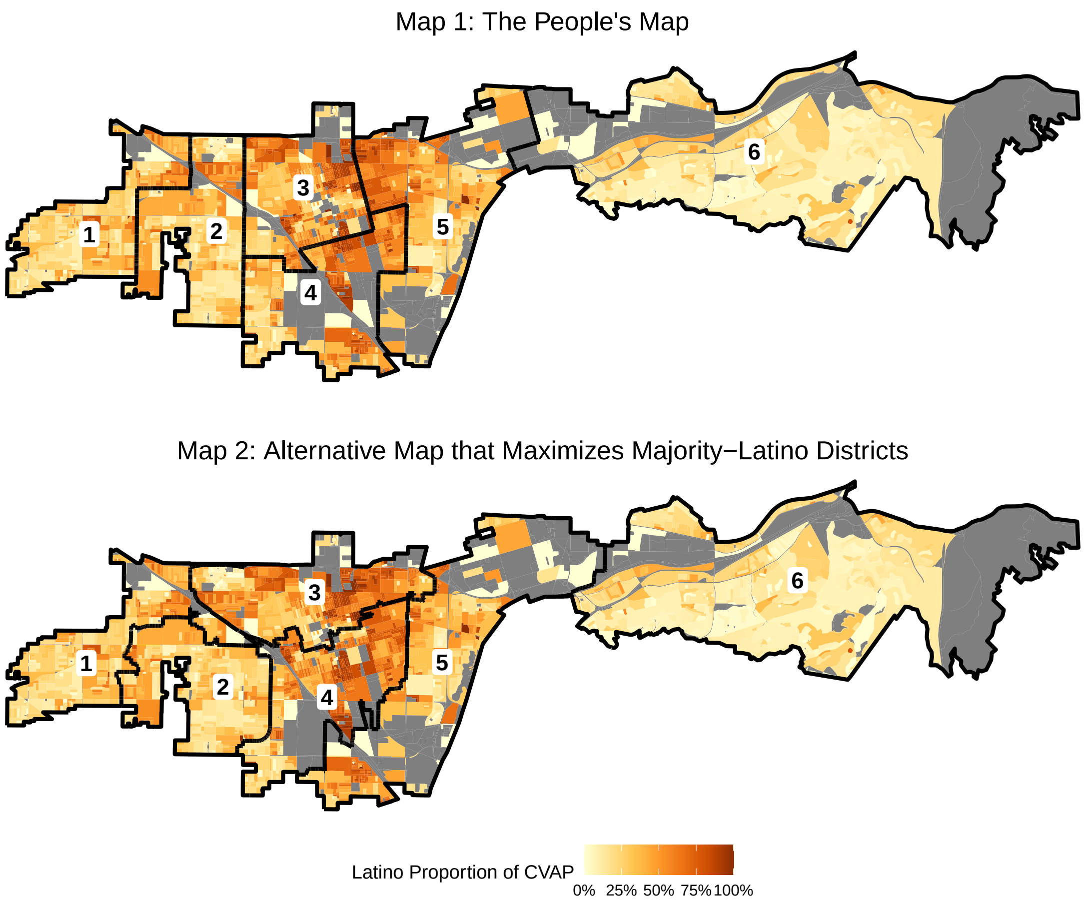
By the same token, the maps reveal how physical and political geography constrain what can be achieved. The sparsely populated east side of the city, the Anaheim Hills—home to parks, nature reserves, and expensive homes—forms a natural district (District 6) under the compactness, contiguity, and equal-population constraints. A narrow peninsula on the city's western edge similarly anchors District 1. Because Anaheim's Latino population is concentrated in the urban center while white residents tend to live in the less densely populated areas to the west, east, and south, white voters constitute the majority in any perturbation of the "naturally occurring" Districts 1 and 6. By contrast, the four central districts leave the mapmaker considerable freedom: the bottom map pulls Latino voters from District 5 to lift Districts 3 and 4 above the 50% threshold.

Which approach would maximize Latino electoral success: concentrating Latino voters into two safe majority-Latino districts, as in Brandman's proposal, or spreading them across more diffuse "opportunity districts," as under the People's Map? Were other, superior alternatives available but undiscovered due to the limitations of the technology at hand? Could the disagreement have been avoided entirely by a reform that required no map at all? We answer these questions in the analyses that follow.

Data and Methodology

We obtained as many city council district shapefiles as we could find for the 167 cities that we have documented as switching to district elections under the CVRA. Our sample contains 109 first district plans (65% of switchers), which we overlaid with a 2017 Census block-level shapefile to associate each block with a city council district and a set of demographic and political indicators from the U.S. Census, a California voter file obtained from L2, and the California Statewide Database.[5]

[5]See Appendix Table A-1 for details about this sample. Table A-2 presents a comparison of our sample to all 167 switchers and all California cities.



	Latino % CVAP	
District	Map 1	Map 2
1	0.30	0.30
2	0.33	0.32
3	0.49	0.51
4	0.45	0.51
5	0.45	0.39
6	0.16	0.15

Figure 1: Districting in the city of Anaheim. Top panel shows the adopted "People's Map"; bottom panel shows an alternative map that maximizes the number of majority-Latino districts at 2.

These shapefiles constitute the inputs to our districting simulations.[6]

Districting Simulations

To characterize the universe of options available under geographic and legal constraints—and thus to assess how favorable the chosen maps were for Latino representation within that universe—we conduct a set of redistricting simulations. We use the automated redistricting simulator deployed in the `redist` package for `R` (Kenny et al. 2021), which implements a Sequential Monte Carlo (SMC) algorithm (McCartan and Imai 2023) to characterize the distribution of districting plans that satisfy the contiguity, compactness, and population-parity constraints within each of our 109 cities, fixing the number of districts to that of the adopted plan. We generate 5,000 draws from this target distribution, where each draw is an assignment of Census blocks to city council districts. Because these sampled plans are not guaranteed to span the entire range of feasible options, we additionally use short-burst optimization (Cannon et al. 2023) to search for plans that maximize and minimize our outcomes of interest.[7]

The resulting distributions can be interpreted as a "race-neutral baseline" for each city, as they are constructed without reference to racial demographics, partisanship, incumbency, or other optional criteria (e.g., preservation of "communities of interest").[8] In other words, sampling from the simulation distribution should be understood as generating a representative sample of cities' alternatives under minimal legal and geographic constraints, not the plans they would likely have adopted given additional, context-specific considerations. Where an adopted map falls in this distribution measures the favorability of the city's choice relative to available alternatives, and the short-burst plans bound the feasible set from above and below.

Measuring Latino Electoral Success

Majority-Latino CVAP districts. As Anaheim's experience shows, conversations surrounding the CVRA have focused on the creation of majority-Latino CVAP districts. The 50% CVAP

[6]For further details on the data construction process, see Appendix A.

[7]Implemented by the `redist_shortburst()` function in `redist`. For a detailed discussion of both algorithms and parameter values, see Appendix C. Appendix Table C-5 presents diagnostics.

[8]Defined by state law as populations sharing social or economic interests that warrant inclusion in a single district (Cal. Elec. Code § 21601(c)). While some cities prioritized keeping communities of interest together, we treat this as an endogenous choice rather than a constraint.

threshold is intuitive to the average citizen, and the simplest measure of an empowered voting bloc: a group comprising 50% of the citizen voting-age population can, in principle, elect its preferred candidate, regardless of that candidate's ethnic identity.

Expected Latino council share. Useful as a measure of political strength, the 50% CVAP threshold is agnostic about the preferences of the Latino voting bloc, and ignores cross-ethnic coalitions that may propel Latino candidates to office even in the absence of Latino majorities. We therefore also measure the reform's success in terms of the expected ethnic composition of councils. This outcome depends on the behavior of Latino and non-Latino voters along three dimensions. The first is voter *turnout*. Latinos vote at lower rates than whites across the board (Fraga 2018), effectively raising the CVAP threshold a district must clear before Latino voters constitute an electoral majority. Second, descriptive representation follows from demographic majorities only insofar as Latino voters coalesce around Latino candidates (*cohesion*). Third, Latino candidates need not rely on Latino votes alone; also relevant is the fraction of non-Latino voters who will support them (*crossover*).

We begin with assumptions derived from observed voting patterns in these cities. Turnout comes from the L2 voter file, which records each registrant's validated vote history and predicted ethnicity. For each city, we compute Latino and non-Latino turnout as the share of each group's registrants who voted on average over the 2014 and 2016 general elections, and use these rates to convert each district's Latino CVAP share into a turnout-adjusted share of the electorate. For cohesion and crossover, we construct an empirical benchmark from four statewide top-two races that pitted a Latino against a non-Latino candidate of the same party, so that differences in support across precincts reflect ethnic rather than partisan cleavages. For each simulated district, we aggregate block-level votes for the Latino and the leading non-Latino candidate, compute the Latino candidate's district-level vote share in each race, and average across the four races.

These assumptions enter into a logical model (Atsusaka 2021), which takes as inputs a district's effective Latino share of the electorate (C) along with a measure of racial polarization (M), and returns as output the predicted probability that a district elects a Latino candidate. We set M to the observed racial margin from the four statewide primary races and C to each district's turnout-reweighted Latino CVAP share.[9] We compute the probability of a Latino candidate winning separately for every district in a simulated plan and then use these probabilities in a Monte Carlo simulation to compute the expected Latino council share.[10]

These assumptions need not be static. The reform could mobilize Latino voters by making their votes pivotal in majority-Latino districts (Fraga 2018; Hertz 2023), and the public attention to Latino voting rights that accompanies a CVRA transition may strengthen in-group cohesion and provoke white crossover support or backlash. As discussed, behavior is also a moving target for reasons unrelated to the reform. The decline in Latino support for the Democratic Party may portend weaker cohesion behind Latino candidates as well (Fraga, Velez and West 2025).

Thus, we vary these inputs. First, we ask how district performance changes in the best case: the Latino turnout gap closes entirely. To do so, we compute predicted Latino council shares under a counterfactual in which Latino registrants turn out at the same rates as non-Latino registrants in each city and compare these estimates to those derived from using the observed turnout gap. Second, for cohesion and crossover, we bound plausible future behavior with a range of assumptions on either side of the status quo. On the optimistic end, Latino cohesion remains high and non-Latino crossover support rises, consistent with district elections and the attention that accompanies a CVRA transition strengthening in-group solidarity and drawing sympathetic crossover votes. On the pessimistic end, cohesion weakens while crossover stays limited. We evaluate the model by varying one parameter at a time: cohesion at 60%, 80%, and 100% (the share of Latinos supporting the Latino candidate), while holding crossover at 30%; and crossover at 20%, 30%, and 40% (the share of the city's non-Latinos supporting the Latino candidate), while holding cohesion at 80%.

Alternative Electoral Institutions

We also investigate electoral institutions beyond district elections. Benade et al. (2021) provide a framework for estimating electoral outcomes from the size of racial groups, their levels of racial cohesion and crossover, the number of seats in an electoral contest, the number of candidates from each group, and the degree of internal coordination on candidates. These parameters generate synthetic ballots that can be aggregated under cumulative voting, limited voting, or single transferable

[9] M embeds implied levels of cohesion and crossover, which we need not estimate directly.

[10] See Appendix D for further details about the logical model and its parameters.

vote systems. Our outcome of interest is the expected Latino share of the council.

We implement this framework in a two-bloc, two-slate setup, running 500 simulations of 1,000 ballots per city with parameters tailored to each city's electoral context. Specifically, we use city council election returns compiled by de Benedictis-Kessner and Bernhard (2022) to derive these contextual factors from recent elections in each city. The election dataset gives us the number of seats per contest and candidate counts by group, which are estimated by applying Bayesian Improved Surname Geocoding to candidates in the three at-large elections preceding the city's switch. The Latino electorate share is the turnout-adjusted Latino proportion of CVAP, computed from the same block-level CVAP data used in our districting simulations. We assume that both Latinos and non-Latinos are internally homogeneous in their preferences over their respective slates of candidates. Our estimates are therefore best read as attainable rather than guaranteed outcomes. We select values of cohesion and crossover to mirror the ones used in the districting simulations.[11]

Results

The Limits of District Elections

Figure 2 shows the simulation distribution of the proportion of majority-Latino CVAP districts for every city in our sample. The solid black line represents the range of the distribution estimated by SMC; the dashed black line extends this to the feasible range found through short-burst optimization. The red diamond marks the enacted plan, and the number to its right gives the enacted plan's percentile in the distribution. Anaheim's "People's Map," for example, falls in the 25th percentile of its simulation distribution. This plan has zero majority-Latino districts, whereas the city could have drawn anywhere from zero to two.

Most strikingly, 61% of the cities in the sample cannot draw a single majority-Latino district. For these cities, there is simply no variation in the outcome across plans. At the other extreme, 3% of cities can draw *only* majority-Latino districts, owing to their large Latino populations. Notably, among the 39 cities (36% of the sample) with any variation in the number of majority-Latino districts they can draw, 87% chose a map above the 50th percentile in its capacity to create majority-Latino districts.

[11] For a detailed discussion of the ballot simulation, see Appendix E.

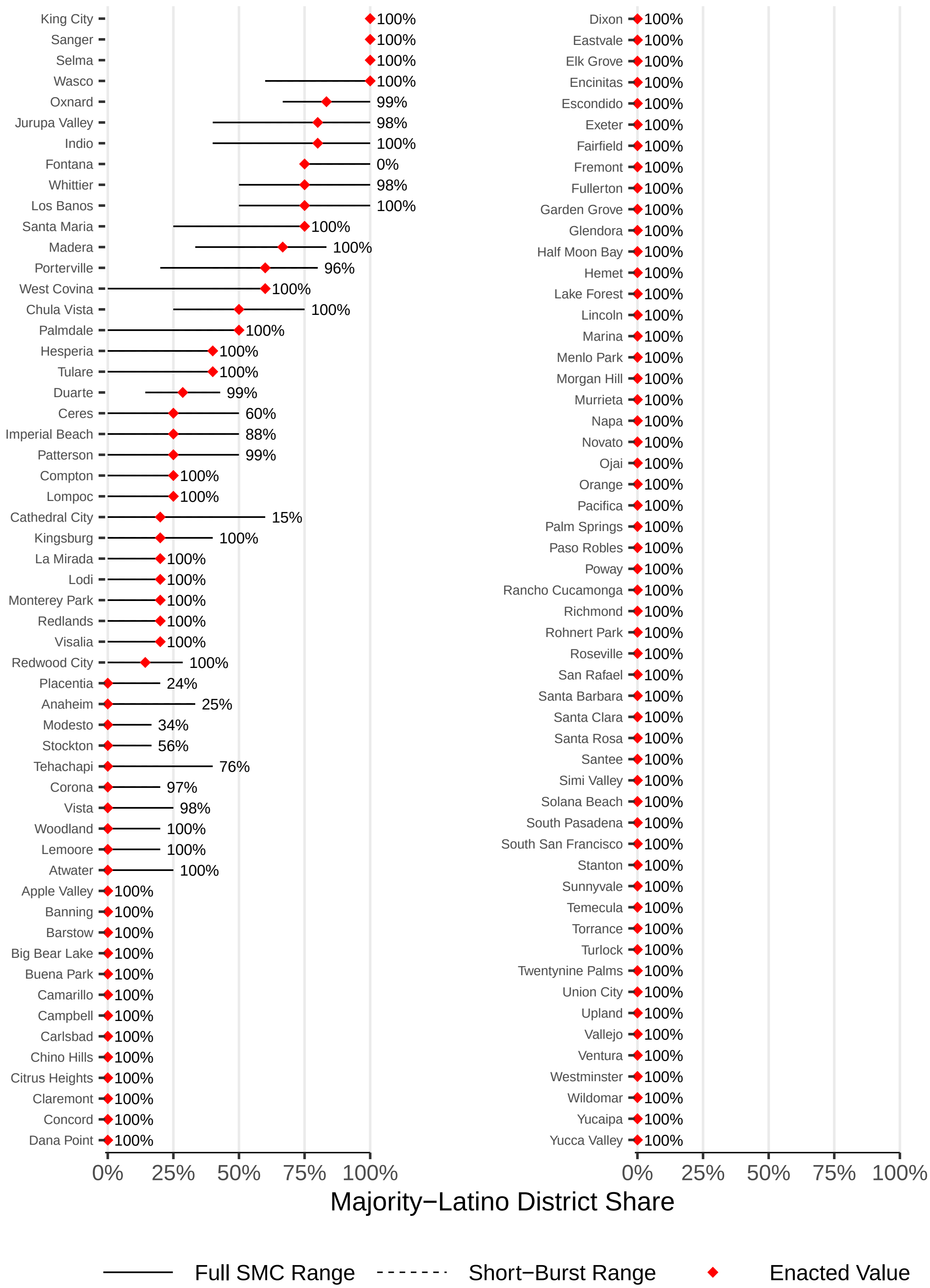


Figure 2: Simulation distributions of share of districts with majority-Latino CVAP. The solid line shows the SMC distribution of majority-Latino districts, and the dotted line shows the short-burst range. The red diamond marks the enacted plan; the number at right gives its percentile in the simulation distribution.

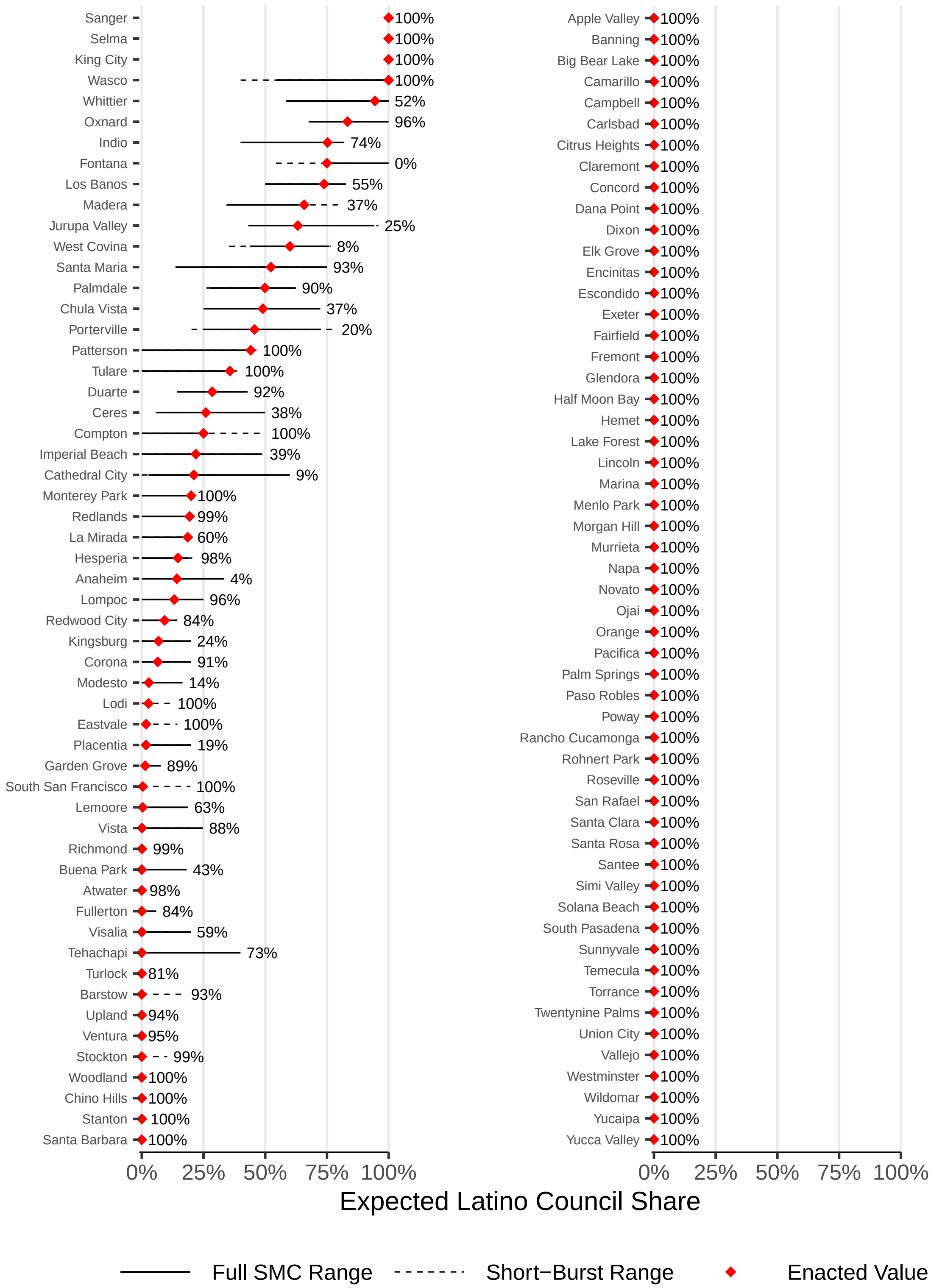


Figure 3: Simulation distributions of expected Latino council share, assuming each city's observed turnout gap. Presentation follows Figure 2.

The tendency to draw fewer majority-Latino districts need not reflect a desire to stymie the reform. In Anaheim, highly mobilized activists believed there were benefits to multiple opportunity districts even if no single district crossed the 50% threshold, expecting crossover voting to propel Latino candidates to office. In Figure 3, we assess this expectation by replicating Figure 2 with expected Latino council share as the outcome. The estimates presented assume observed levels of Latino cohesion and non-Latino crossover and apply each city's observed turnout gap. We find that 50% of cities cannot draw a single map with an expected Latino council share above zero. Again, when cities had room to maneuver, they chose favorably for Latinos: among the 55 cities with variation in expected Latino council share, 18% implemented a map achieving the most favorable plan in the simulation distribution, and only 14 cities selected a map in the bottom half of their distribution.

District Performance under Counterfactual Voter Behavior

Closing the Turnout Gap Might the limited performance of district elections stem from the turnout gap? Recall that the estimates in Figure 3 rely on turnout observed before each city's switch to district elections, but the switch could plausibly narrow this gap. Figure 4 therefore plots the maximum expected Latino council share attainable under the most favorable simulated map, at the observed turnout gap and with the gap closed entirely. Closing the gap leaves the attainable maximum unchanged in 58 of 109 cities, which are omitted from Figure 4. Among the remaining 51 cities, it raises the attainable maximum by more than 5 points in 35 cities, but by less than 5 percentage points in 16 cities.[12] The limited effects of district elections are not primarily a function of differential turnout.

Shifting Cohesion and Crossover Cohesion and crossover could likewise respond to the reform, or drift on their own. Figure 5 therefore evaluates a grid of alternative assumptions, plotting expected Latino council share against citywide Latino CVAP share. The solid black curve in both panels shows the relationship at observed behavior, corresponding roughly to 80% cohesion and 30% crossover. Note the shape of this curve: a city at 50% Latino CVAP can expect a 50% Latino council, but expected council share severely lags CVAP share in the 10–30% range, where the vast

[12] Compton is an outlier: Latinos there turn out at higher rates than non-Latino voters.

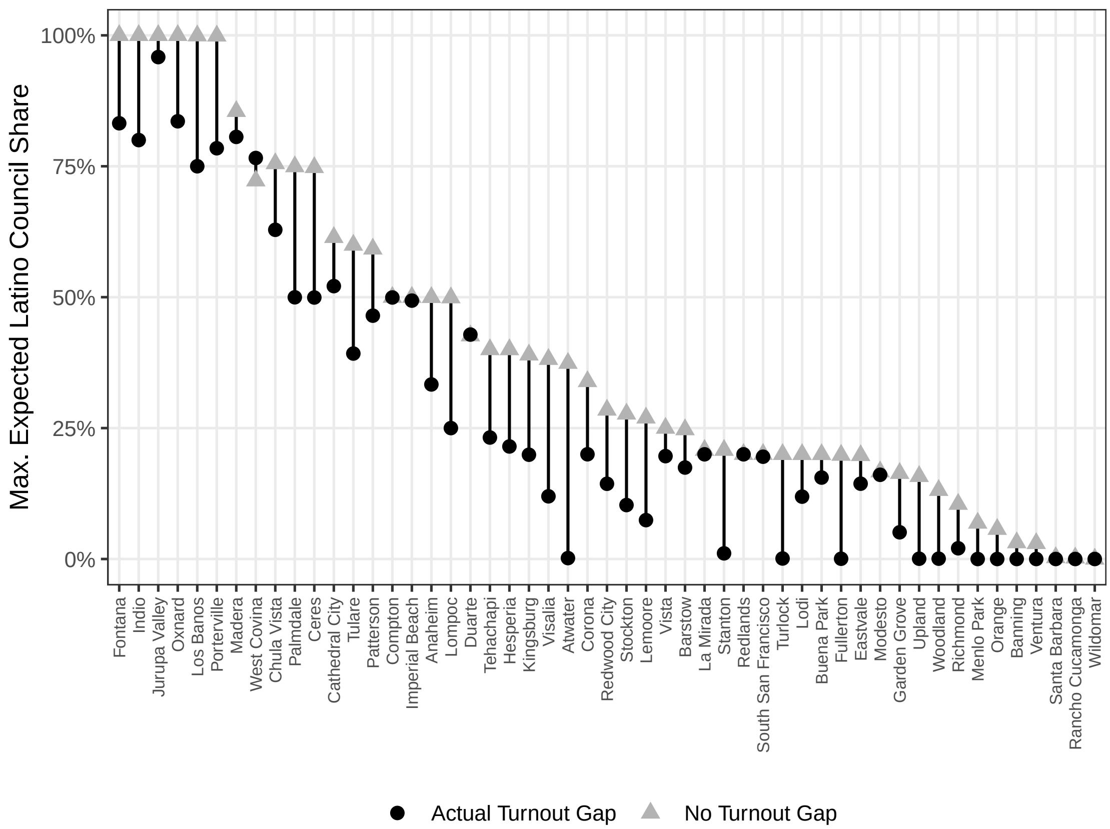


Figure 4: Effect of closing the turnout gap. Black-filled circles represent the city's estimated Latino council share under the most favorable map. Grey triangles are the expected council share assuming no turnout gap.

majority of our cities fall. At 30% Latino CVAP, the expected Latino council share is zero.

The left panel varies Latino cohesion while holding crossover at 30%. Increases beyond the already high observed baseline do not yield significant representational gains. A decline, by contrast, would be costly. Were cohesion to fall to 60%, even a city at 50% Latino CVAP could expect only a 25% Latino council. The right panel varies crossover while holding cohesion at 80%, and the effects are modest. Raising crossover to 40% hardly shifts the curve, and cutting it to 20% shifts it only slightly rightward. No assumption changes the curve's fundamental shape: expected Latino council share remains essentially zero below roughly 30% Latino CVAP. The limited potential of district elections is not attributable to voting behavior. Even full Latino cohesion offers little opportunity for Latino descriptive representation in the cities where most CVRA reform has occurred.

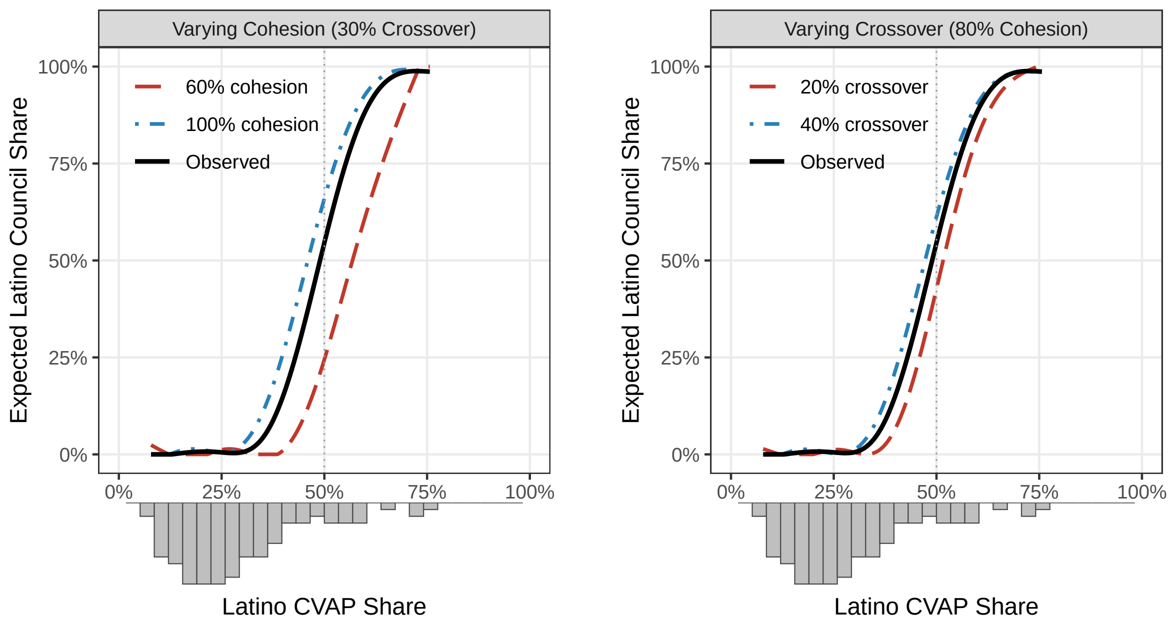


Figure 5: Relationship between Latino CVAP share and expected Latino council share. Black curve indicates the observed relationship in our data, modeled using a generalized additive model to allow for nonlinearities. Dashed curves model the relationship under different levels of Latino cohesion (left) and non-Latino crossover support (right). Histograms at bottom show the distribution of Latino CVAP share for cities in our sample.

The Promise of Alternative Remedies

Given the limited possibilities under district elections, how would these cities fare under cumulative voting, limited voting, and the single transferable vote? Figure 6 plots, for every city and each system, the difference between median expected Latino council share and the city's Latino CVAP share, across three cohesion scenarios. Two patterns emerge.

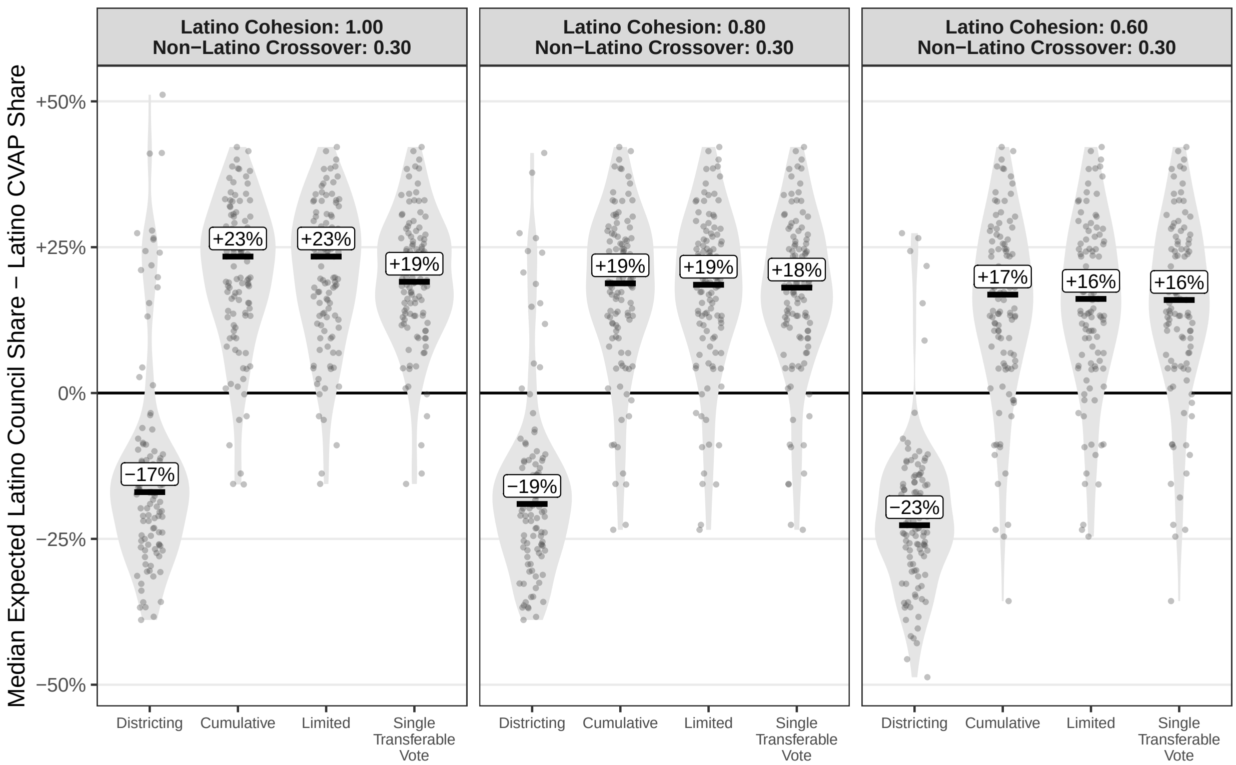


Figure 6: Relationship between electoral system and Latino descriptive representation under varying levels of Latino cohesion and non-Latino crossover. Each point is one city; boxed labels report the cross-city median. Expected shares incorporate each city's observed turnout gap; the benchmark is the unadjusted CVAP share.

First, the three alternative systems produce similar distributions within each scenario. This is not as surprising as it may appear: although the systems tally votes differently, they share the property that a cohesive voting bloc can convert its vote share into a comparable seat share provided it can internally coordinate on the slate of candidates. Since we embed this coordination assumption in our simulations, the mechanical differences among the three rules matter only at the margins.[13]

[13] Appendix Figure E-1 shows that the systems do come apart under alternative assumptions about coordination.

Second, all three systems deliver expected Latino council shares *above* proportionality—exceeding Latino CVAP share by 16 to 23 percentage points in the median city, depending on cohesion—while districting falls 17 to 23 points below it. This substantial gap highlights an important difference in the efficiency with which district-based and proportional-family systems absorb crossover votes.[14] Under proportional rules, every crossover ballot counts toward seats, regardless of where the voter lives. Consider a city whose electorate is 20% Latino, with cohesion of 0.6 and crossover of 0.3. The Latino slate's expected vote share is $0.2 \times 0.6 + 0.8 \times 0.3 = 36\%$, which is 16 points above the group's population share.[15] By contrast, under districting, residential segregation wastes significant crossover votes: 30% crossover in an overwhelmingly white district still leaves a Latino candidate short of a majority. These votes are only pivotal in demographically mixed districts where Latinos are a large but not already dominant share of the electorate.

Discussion

Following the hollowing out of the federal VRA, nearly half of state legislatures have passed or introduced their own VRA. These VRAs offer both district elections and, often, proportional representation systems as remedies to minority vote dilution in local government. Applying redistricting and ballot simulation algorithms to the CVRA, we assessed representational outcomes under enacted district maps, maps that were possible but not selected, and proportional systems requiring no maps.

Our findings present a sobering picture for district elections. In most cities, geography and demography prevent the construction of districts which would meaningfully improve representation. Thus, by expanding the set of cases where voter dilution claims would succeed, the CVRA brought district elections to cities where the reform would have little impact on Latino electoral success under even the most optimistic assumptions about turnout, cohesion, and crossover. California councils generally chose favorable maps, but the state's intense interest-group monitoring may not travel elsewhere. Even favorable maps tend to protect incumbents, disadvantaging Latino candidates (Loffredo, Hankinson and Magazinnik 2026).

[14] For reference, see the bottom row of Appendix Figure E-1 for estimates from a simulation with full Latino cohesion and no crossover.

[15] This closely matches our estimated +16% to +17% median. The same calculation nearly reproduces the medians in the other panels: 40% at 0.8 cohesion (+18% to +19%) and 44% at full cohesion (+19% to +23%).

We also demonstrate that systems in the proportional representation family do not share these limitations. These systems require neither a spatially concentrated minority nor the selection of a favorable map by the incumbent council. Across our simulations, all three alternative systems deliver Latino council shares exceeding proportionality in the very cities where district elections fail, and they do so under a wide range of assumptions about cohesion, crossover, and candidate strength. For the cities where districting is limited by geography and demography, proportional reforms may be the only remedy for advancing minority descriptive representation.

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Supplemental Information for "Assessing District Elections as a Remedy in State Voting Rights Acts"

A Data Construction and Summary Statistics

Table A-1: City Data Collection Status

City	**Year**	**Included in Study**	**City**	**Year**	**Included in Study**	**City**	**Year**	**Included in Study**
Alhambra	2018		Half Moon Bay	2018	✓	Rancho Cucamonga	2016	✓
Anaheim	2015	✓	Hemet	2016	✓	Redlands	2017	✓
Antioch	2018		Hesperia	2017	✓	Redwood City	2018	✓
Apple Valley	2019	✓	Highland	2016		Richmond	2019	✓
Arcadia	2017		Imperial Beach	2018	✓	Riverbank	2015	
Arroyo Grande	2019		Indio	2017	✓	Rohnert Park	2020	✓
Atascadero	2022		Jurupa Valley	2017	✓	Roseville	2019	✓
Atwater	2017	✓	King City	2016	✓	San Francisco	2000	
Bakersfield	2018		Kingsburg	2018	✓	San Juan Capistrano	2016	
Banning	2016	✓	La Mirada	2016	✓	San Marcos	2016	
Barstow	2018	✓	La Palma	2022		San Mateo	2021	
Bellflower	2016		Lake Elsinore	2018		San Rafael	2018	✓
Big Bear Lake	2017	✓	Lake Forest	2017	✓	San Ramon	2019	
Brentwood	2019		Lakewood	2021		Sanger	2010	✓
Buellton	2018		Lemoore	2018	✓	Santa Ana	2018	
Buena Park	2016	✓	Lincoln	2020	✓	Santa Barbara	2014	✓
Camarillo	2019	✓	Livermore	2018		Santa Clara	2018	✓
Campbell	2019	✓	Lodi	2017	✓	Santa Clarita	2016	
Carlsbad	2017	✓	Lompoc	2017	✓	Santa Cruz	2020	
Carpinteria	2017		Los Alamitos	2018		Santa Maria	2017	✓
Carson	2020		Los Banos	2014	✓	Santa Rosa	2017	✓
Cathedral City	2017	✓	Madera	2010	✓	Santee	2018	✓
Ceres	2015	✓	Malibu	2020		Selma	2019	✓
Chino	2016		Manteca	2021		Simi Valley	2018	✓
Chino Hills	2016	✓	Marina	2019	✓	Solana Beach	2018	✓
Chula Vista	2012	✓	Martinez	2017		South Pasadena	2017	✓
Citrus Heights	2019	✓	Menlo Park	2017	✓	South San Francisco	2018	✓
Claremont	2018	✓	Merced	2015		Stanton	2017	✓
Coalinga	2018		Millbrae	2022		Stockton	2016	✓
Compton	2012	✓	Mission Viejo	2022		Sunnyvale	2018	✓
Concord	2018	✓	Modesto	2008	✓	Tehachapi	2017	✓
Corona	2016	✓	Monterey Park	2019	✓	Temecula	2017	✓
Costa Mesa	2016		Moorpark	2018		Torrance	2018	✓
Dana Point	2018	✓	Morgan Hill	2017	✓	Tulare	2012	✓
Davis	2019		Murrieta	2017	✓	Turlock	2014	✓
Desert Hot Springs	2021		Napa	2020	✓	Tustin	2021	
Diamond Bar	2022		National City	2021		Twentynine Palms	2018	✓
Dixon	2016	✓	Novato	2019	✓	Union City	2019	✓
Duarte	2017	✓	Oceanside	2017		Upland	2016	✓
Dublin	2022		Ojai	2018	✓	Vacaville	2018	
Eastvale	2016	✓	Ontario	2020		Vallejo	2018	✓
El Cajon	2016		Orange	2018	✓	Ventura	2018	✓
El Monte	2022		Oroville	2019		Victorville	2021	
Elk Grove	2019	✓	Oxnard	2018	✓	Visalia	2014	✓
Encinitas	2017	✓	Pacifica	2018	✓	Vista	2017	✓
Escondido	2013	✓	Palm Desert	2019		Wasco	2017	✓
Eureka	2016		Palm Springs	2018	✓	West Covina	2016	✓
Exeter	2017	✓	Palmdale	2015	✓	Westminster	2019	✓
Fairfield	2019	✓	Paso Robles	2018	✓	Whittier	2014	✓
Fontana	2017	✓	Patterson	2016	✓	Wildomar	2016	✓
Fremont	2017	✓	Perris	2021		Windsor	2019	
Fullerton	2016	✓	Petaluma	2021		Woodland	2014	✓
Garden Grove	2016	✓	Placentia	2016	✓	Yuba City	2022	
Glendale	2018		Pleasanton	2021		Yucaipa	2016	✓
Glendora	2017	✓	Porterville	2018	✓	Yucca Valley	2018	✓
Goleta	2017		Poway	2017	✓			

Note: Check marks indicate the 109 of 167 switching cities included in the study. Year is the year the city switched to district elections.

We obtained as many city council district shapefiles as we could find for the California cities that have converted to district elections under the CVRA. Through a combination of searching online and contacting city government offices by phone, we ultimately obtained 109 shapefiles, covering 65% of the 167 cities that we have documented as having switched or committed to switching to district elections in the wake of the CVRA. Table A-1 lists each of these 167 cities, identifies the year they switched to district elections, and indicates the set of cities we were able to collect shapefiles for and include in this study.

Table A-2: City Summary Statistics

Variable	**All** N = 482	**Switched** N = 167	**Included** N = 109
Population	68,097 (209,042)	87,318 (90,216)	83,655 (64,617)
% Non-Latino White	43.2 (24.8)	39.4 (18.7)	38.6 (18.1)
% Latino	37.0 (25.8)	38.1 (18.8)	40.3 (18.7)
% Non-Latino Black	3.6 (4.8)	4.1 (4.4)	3.9 (4.2)
% Asian	12.1 (14.2)	14.3 (14.5)	13.2 (13.8)
% Other	4.1 (2.4)	4.1 (1.7)	4.0 (1.7)
Median Income ($)	85,996 (42,794)	83,922 (28,005)	81,457 (26,363)
% Homeownership	58.7 (14.1)	59.0 (10.7)	59.0 (9.6)
Dissimilarity	0.225 (0.117)	0.262 (0.094)	0.270 (0.099)
Gini Coefficient	0.130 (0.056)	0.149 (0.045)	0.150 (0.041)
Unknown	32	0	0

[1] Mean (SD)

Table A-2 compares our sample to the larger sample of cities that have switched to districts, and to all California cities. All demographic and economic measures presented in the table come from the 2020 American Community Survey (ACS) 5-year estimates, retrieved from the Census Bureau API via the `tidycensus` package for `R`. We present these same measures for each city included in this study in Table A-3. At the place level, we collected data for every incorporated city and town in California: total population and race/ethnicity from table B03002, median household income from table B19013, and housing tenure from table B25003. Because table B03002 classifies race and Hispanic origin jointly, our racial and ethnic categories are mutually exclusive: Latino residents of any race, and non-Latino White, Black, and Asian residents (with Native Hawaiian and Pacific Islander residents grouped with Asian residents); the remaining population is classified as "Other." The homeownership rate is the share of occupied housing units that are owner-occupied. To construct the within-city segregation and inequality measures, we additionally collected tract-level median household income and Latino and non-Latino population counts from the same tables. We assigned tracts to cities by spatially intersecting tract boundaries with place boundaries, dropping tracts with missing median income or zero population, and computed the Gini and dissimilarity indices described below from the tracts falling within each city.

- **Gini Index**: Let $x = (x_1, x_2, \ldots, x_n)$ denote the vector of tract-level median incomes, and let $w = (w_1, w_2, \ldots, w_n)$ denote the corresponding population weights. We first calculated the weighted mean income: $\mu = \frac{\sum_{i=1}^{n} w_i x_i}{\sum_{i=1}^{n} w_i}$. We then computed all pairwise absolute differences in income $|x_i - x_j|$, weighted by the product of tract populations $w_i w_j$. The Gini index was calculated using the following formula: $G = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j |x_i - x_j|}{2\mu\left(\sum_{i=1}^{n} w_i\right)^2}$.
- **Dissimilarity index.** Let L_i and NL_i denote the Latino and non-Latino population in tract

i, respectively, and let $L = \sum_i L_i$ and $NL = \sum_i NL_i$ be the total Latino and non-Latino population in the city, respectively. The dissimilarity index is given by: $D = \frac{1}{2} \sum_{i=1}^{n} \left| \frac{L_i}{L} - \frac{NL_i}{NL} \right|$.

We then overlaid the shapefiles we collected from each city on a Census block-level shapefile from 2017,[1] which allowed us to associate each block with a city council district as well as a set of political and demographic indicators (e.g., citizen voting-age population) obtained from the U.S. Census, a statewide voter file from the data vendor L2, and the California Statewide Database.[2] The resulting standardized and enhanced shapefiles constituted the inputs into our simulations.

[1] Obtained from: https://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2017&layergroup=Blocks+%282010%29.

[2] https://statewidedatabase.org/.

Table A-3: City-Level Summary Statistics

City	Population	% Non-Latino White	% Latino	% Non-Latino Black	% Asian	% Other	Median Income ($)	% Home-ownership	Dissimilarity	Gini Coefficient
Anaheim	353,085	23.9	53.3	2.5	17.6	2.7	76,723	45.6	0.338	0.174
Apple Valley	73,339	45.4	39.1	8.6	2.6	4.4	54,929	64.7	0.201	0.189
Atwater	30,336	33.7	55.5	3.6	5.1	2.1	57,052	52.4	0.195	0.142
Banning	30,276	37.4	47.0	7.1	3.8	4.7	43,442	68.6	0.350	0.140
Barstow	23,547	23.5	44.8	16.1	4.7	10.9	42,912	41.0	0.096	0.167
Big Bear Lake	5,302	64.5	31.4	0.4	1.9	1.8	54,896	56.6	0.227	0.149
Buena Park	82,228	23.6	37.9	2.8	33.0	2.8	84,680	56.6	0.247	0.149
Camarillo	68,583	56.0	29.1	2.3	8.8	3.8	98,039	63.8	0.200	0.136
Campbell	42,891	48.5	19.7	2.3	23.6	5.9	122,644	49.2	0.254	0.163
Carlsbad	114,411	69.3	15.5	1.0	8.9	5.2	112,933	62.5	0.312	0.158
Cathedral City	54,812	32.0	56.7	1.6	7.4	2.4	50,350	61.6	0.379	0.191
Ceres	48,355	23.6	62.3	3.4	7.6	3.1	59,247	60.0	0.193	0.132
Chino Hills	82,800	28.6	27.5	3.6	36.9	3.5	104,661	73.0	0.290	0.113
Chula Vista	268,779	16.9	60.3	4.5	15.1	3.2	86,132	60.1	0.291	0.200
Citrus Heights	87,665	67.6	19.9	3.3	3.4	5.7	65,867	58.5	0.207	0.096
Claremont	35,610	50.7	23.2	4.9	14.9	6.4	101,080	66.0	0.097	0.176
Compton	95,804	0.9	69.3	27.0	1.2	1.6	58,703	55.9	0.308	0.110
Concord	129,227	47.4	29.1	3.5	13.1	6.9	92,706	60.1	0.330	0.177
Corona	168,112	31.7	47.9	6.0	10.9	3.6	88,434	63.6	0.322	0.191
Dana Point	33,782	73.7	16.3	2.1	3.9	3.9	105,250	62.7	0.194	0.138
Dixon	20,106	49.1	41.3	2.1	4.7	2.9	79,465	60.2	0.102	0.059
Duarte	21,399	23.2	52.3	6.4	16.0	2.1	82,620	64.0	0.191	0.152
Eastvale	65,766	20.6	40.1	7.2	28.0	4.2	127,881	78.8	0.130	0.063
Elk Grove	173,370	33.5	19.0	10.4	30.4	6.7	101,776	73.9	0.133	0.122
Encinitas	62,967	76.4	15.9	0.3	3.8	3.6	120,488	63.8	0.284	0.145
Escondido	150,396	35.8	51.9	2.1	6.3	4.0	65,326	51.3	0.379	0.236
Exeter	10,433	46.4	47.1	0.8	3.1	2.6	48,605	63.1	0.280	0.078
Fairfield	116,544	29.9	29.8	16.3	17.2	6.8	86,204	59.0	0.316	0.179
Fontana	212,704	14.0	68.5	8.0	6.7	2.8	75,681	66.3	0.330	0.187
Fremont	234,829	18.9	12.8	3.1	61.5	3.8	142,374	61.4	0.310	0.125
Fullerton	141,061	33.8	36.8	1.9	23.9	3.6	85,471	53.7	0.386	0.174
Garden Grove	172,800	18.7	36.6	0.8	42.0	1.9	73,611	53.7	0.313	0.132
Glendora	51,087	46.5	36.2	1.7	11.7	3.9	99,153	70.4	0.212	0.112
Half Moon Bay	12,583	60.8	28.2	0.4	6.4	4.2	131,233	67.0	0.342	0.158
Hemet	84,686	38.9	47.3	8.1	2.7	3.0	43,152	59.8	0.224	0.203
Hesperia	95,163	32.3	59.1	3.9	2.6	2.1	54,149	62.2	0.183	0.159
Imperial Beach	27,334	32.4	51.5	5.5	6.3	4.3	59,795	32.3	0.251	0.192
Indio	89,996	27.9	64.9	3.5	2.2	1.5	53,434	72.2	0.484	0.177

Table A-3: City-Level Summary Statistics *(continued)*

City	Population	% Non-Latino White	% Latino	% Non-Latino Black	% Asian	% Other	Median Income ($)	% Home-ownership	Dissimilarity	Gini Coefficient
Jurupa Valley	106,646	19.7	71.4	3.0	4.3	1.6	77,787	68.9	0.324	0.170
King City	13,845	8.8	87.6	1.0	1.2	1.4	50,174	39.5	0.387	0.159
Kingsburg	12,116	41.0	47.7	0.3	7.9	3.1	73,281	64.8	0.206	0.089
La Mirada	48,260	32.9	42.0	1.3	20.9	2.9	92,493	77.4	0.197	0.139
Lake Forest	84,666	51.8	23.2	2.0	17.8	5.2	112,988	70.4	0.293	0.142
Lemoore	25,867	38.5	44.0	5.7	7.6	4.3	68,658	52.5	0.138	0.114
Lincoln	48,150	69.4	18.4	1.2	6.9	4.0	88,991	81.0	0.244	0.169
Lodi	66,562	45.8	37.8	1.4	11.2	3.7	64,153	52.8	0.268	0.178
Lompoc	42,753	29.1	60.4	3.1	3.8	3.6	57,071	45.3	0.330	0.189
Los Banos	39,443	20.2	71.4	1.7	4.2	2.5	64,567	57.3	0.267	0.130
Madera	65,575	14.3	78.3	4.2	1.7	1.5	49,335	50.6	0.251	0.178
Marina	21,966	39.7	28.2	6.7	15.7	9.7	73,115	41.2	0.087	0.084
Menlo Park	35,211	57.4	15.8	4.0	17.4	5.4	167,567	58.2	0.636	0.217
Modesto	214,485	42.5	40.7	4.7	8.5	3.6	62,182	55.7	0.311	0.173
Monterey Park	60,597	5.0	27.4	0.4	65.8	1.4	63,389	50.7	0.316	0.139
Morgan Hill	44,789	45.5	34.0	1.6	15.1	3.8	128,373	72.6	0.189	0.142
Murrieta	114,066	47.6	32.5	4.5	9.5	5.9	91,654	66.1	0.167	0.131
Napa	78,294	53.0	39.9	0.6	2.8	3.7	85,953	58.6	0.312	0.149
Novato	53,781	63.0	20.5	3.7	6.1	6.6	101,629	69.9	0.271	0.131
Ojai	7,613	77.9	16.8	0.2	3.3	1.7	75,653	56.9	0.101	0.032
Orange	139,322	43.8	38.2	1.4	12.8	3.9	96,605	59.2	0.335	0.187
Oxnard	207,722	13.6	75.1	2.1	7.0	2.2	77,050	54.5	0.421	0.149
Pacifica	38,663	51.4	18.6	2.4	22.0	5.5	130,466	69.2	0.139	0.051
Palm Springs	48,390	61.9	25.2	4.6	5.1	3.2	57,916	63.7	0.298	0.164
Palmdale	153,240	19.5	61.6	12.0	4.2	2.8	65,444	63.9	0.278	0.197
Paso Robles	31,480	59.2	34.1	0.3	2.5	4.0	69,297	59.4	0.225	0.115
Patterson	22,309	20.5	66.7	5.0	5.9	1.9	69,947	68.3	0.200	0.092
Placentia	52,049	39.3	38.3	2.4	15.9	4.0	100,707	63.9	0.388	0.178
Porterville	59,056	22.7	68.6	0.3	4.9	3.4	44,095	50.4	0.197	0.151
Poway	49,780	63.8	16.2	1.8	12.8	5.4	115,332	78.9	0.248	0.145
Rancho Cucamonga	178,060	34.8	37.3	9.6	14.0	4.3	92,290	62.5	0.162	0.193
Redlands	71,680	47.2	35.5	5.6	7.3	4.4	81,265	58.5	0.248	0.205
Redwood City	84,518	42.6	36.3	1.2	16.1	3.7	123,294	47.5	0.512	0.223
Richmond	110,051	18.2	44.1	17.4	15.1	5.2	72,463	53.0	0.370	0.184
Rohnert Park	42,559	59.1	27.1	1.7	6.7	5.3	77,831	50.7	0.325	0.123
Roseville	138,860	66.4	15.6	1.8	11.7	4.5	95,519	67.5	0.191	0.189
San Rafael	59,178	57.8	30.3	1.5	6.5	3.9	97,009	49.4	0.561	0.180

Table A-3: City-Level Summary Statistics *(continued)*

City	**Population**	**% Non-Latino White**	**% Latino**	**% Non-Latino Black**	**% Asian**	**% Other**	**Median Income ($)**	**% Home-ownership**	**Dissimilarity**	**Gini Coefficient**
Sanger	26,744	15.0	80.5	0.0	3.2	1.2	52,349	58.7	0.221	0.167
Santa Barbara	90,911	55.8	36.7	1.3	3.7	2.5	81,618	41.3	0.416	0.211
Santa Clara	126,723	30.9	16.3	2.8	45.2	4.8	136,870	43.5	0.209	0.120
Santa Maria	105,528	15.4	76.7	1.2	4.7	2.0	67,634	50.4	0.417	0.138
Santa Rosa	178,391	54.3	32.7	2.3	6.4	4.3	80,472	55.2	0.365	0.135
Santee	57,407	67.4	19.7	1.9	4.7	6.3	85,826	71.4	0.113	0.112
Selma	24,405	10.7	85.0	0.9	1.8	1.7	42,059	54.9	0.353	0.123
Simi Valley	125,768	58.2	24.5	1.4	11.9	4.0	99,245	71.5	0.248	0.155
Solana Beach	13,301	70.6	15.0	0.9	6.4	7.0	106,904	64.9	0.457	0.099
South Pasadena	25,478	40.0	19.0	4.0	31.8	5.2	109,927	49.0	0.096	0.123
South San Francisco	66,878	22.6	30.4	1.6	41.5	3.9	106,005	61.6	0.289	0.112
Stanton	38,317	19.0	49.2	1.6	27.1	3.1	66,017	48.2	0.242	0.125
Stockton	311,103	19.4	43.5	11.0	20.9	5.1	58,393	49.9	0.307	0.208
Sunnyvale	152,569	29.1	16.7	1.1	48.2	4.9	150,464	44.9	0.388	0.132
Tehachapi	12,718	51.5	35.9	6.8	2.5	3.2	47,039	64.5	0.198	0.101
Temecula	113,117	50.7	30.1	4.1	9.5	5.7	98,631	65.9	0.160	0.117
Torrance	144,430	34.7	19.1	2.7	37.7	5.7	94,781	54.6	0.218	0.119
Tulare	64,546	28.0	63.6	3.0	2.4	3.0	56,024	57.2	0.300	0.167
Turlock	72,715	48.0	40.1	2.0	6.1	3.8	60,799	53.7	0.287	0.206
Twentynine Palms	26,748	52.0	24.5	9.3	5.7	8.6	42,959	31.0	0.296	0.073
Union City	75,067	15.7	19.7	4.5	55.9	4.1	120,772	65.0	0.344	0.149
Upland	77,348	36.8	44.1	6.1	8.8	4.2	76,259	54.6	0.263	0.198
Vallejo	121,275	23.2	27.5	17.8	24.4	7.1	73,869	57.1	0.281	0.193
Ventura	108,467	53.8	36.9	1.6	3.9	3.8	79,986	55.5	0.289	0.159
Visalia	133,100	38.0	51.9	2.2	5.7	2.2	66,668	59.2	0.217	0.163
Vista	100,659	38.4	50.2	2.9	4.9	3.6	73,163	49.6	0.300	0.117
Wasco	27,553	7.4	84.1	5.7	0.9	1.9	39,291	59.4	0.329	0.190
West Covina	105,808	10.8	52.6	4.6	29.5	2.5	85,626	62.7	0.233	0.089
Westminster	90,857	21.8	22.9	0.9	51.4	3.0	67,142	53.4	0.274	0.166
Whittier	84,821	24.5	65.8	1.2	5.0	3.4	76,026	57.7	0.259	0.165
Wildomar	36,091	45.3	40.0	2.8	5.6	6.3	76,791	73.4	0.187	0.127
Woodland	59,759	37.1	49.6	1.6	8.0	3.7	71,477	52.5	0.199	0.177
Yucaipa	54,358	56.3	34.9	1.0	4.4	3.4	73,196	71.6	0.198	0.264
Yucca Valley	21,701	62.1	26.6	4.3	3.5	3.6	47,901	63.6	0.168	0.154

B State VRA Reforms

Table B-4: Electoral Remedies Available Under State Voting Rights Acts

State	Year	District Elections	Ranked Choice Voting / STV	Cumulative Voting	Limited Voting	General PR
Enacted						
California	2002	E	*I*	*I*	*I*	*I*
Washington	2018	E	*I*	*I*	*I*	*I*
Oregon	2019	*I*	*I*	*I*	*I*	*I*
Virginia	2021	*I*	*I*	*I*	*I*	*I*
New York	2022	E	E	E	E	*I*
Connecticut	2023	E	E	E	E	*I*
Minnesota	2024	E	E	E	E	*I*
Colorado	2025	*I*	*I*	*I*	*I*	*I*
Maryland	2026	*I*	*I*	*I*	*I*	*I*
New Jersey	2026	E	*I*	*I*	*I*	*I*
Vermont	2026	*I*	*I*	*I*	*I*	*I*
Failed						
Florida	2024	E	E	E	E	*I*
Michigan	2024	E	E	E	E	*I*
Missouri	2024	E	*I*	*I*	*I*	*I*
Illinois	2025	E	E	E	E	E
Texas	2025	E	E	E	E	E
Alabama	2026	E	E	E	*I*	*I*
Arizona	2026	∅	∅	∅	∅	∅
Georgia	2026	E	*I*	*I*	*I*	E
Louisiana	2026	E	*I*	*I*	*I*	E
Mississippi	2026	E	*I*	*I*	*I*	E
Oklahoma	2026	E	E	E	E	*I*
Rhode Island	2026	*I*	*I*	*I*	*I*	*I*

Note: E = the statute names the method, whether in its remedies clause or in defining the methods a jurisdiction may adopt; *I* = the method is not named, but nothing in the statute forecloses it; ∅ = the statute enumerates the relief a court may order and omits any change to the method of election. Arizona alone is coded ∅: its stated remedies (§ 16-1212) are exclusively procedural (additional voting hours, polling locations, means of voting, registration opportunities, voter education, calendar changes) although § 16-1202(D) prohibits a method of election that dilutes the vote of a protected class. Year is the year of enactment for enacted laws and of introduction for failed bills. Ranked choice voting and the single transferable vote are treated as one category: statutes name the method variously as "proportional ranked-choice voting" (CT, MN, FL, MI, AL, OK), "ranked-choice voting" (NY), or "the single transferable vote" (IL, TX), and these denote the same method. General PR records a statute naming a generic proportional or semi-proportional category, or a proportional method other than those in the preceding columns.

Coding Rule

Codings are three-level, and turn first on whether a statute forecloses a change to the method of election. ∅ is coded where the statute enumerates the relief a court may order and that enumeration omits any change to the method of election. The remedy is not simply unmentioned but excluded by the terms of the list. **E** is coded where the statute names a specific electoral system, including where it does so only in defining "alternative method of election" or an equivalent category. *I* is coded where no specific system is named but nothing forecloses one.

For example, Virginia grants "appropriate remedies that are tailored to remedy the violation" (§ 24.2-130(D)) without enumerating any and names no system, as do Colorado, Maryland, Oregon, Vermont and Rhode Island. Arizona alone is coded ∅ because its § 16-1212 list runs to voting hours, polling locations, means of voting, registration opportunities, voter education and calendar changes, without referencing the method of election. While our reforms of interest are not explicitly prohibited, we consider the AZ VRA potentially more limiting in its openness to electoral reform compared to the other state VRAs.

Where a statute is coded **E**, the named system enters by one of several routes. Georgia's authorizes "altering the method of election," invoking a definition that names the categories (§ 21-3-14(e) with § 21-3-3(8)) whereas Minnesota's remedies section is open-ended and its definitions name the systems (§ 200.58 with § 200.52, subd. 4(d)). **E** therefore records legislative specification, not a holding that a court has been authorized to impose the method. Naming does not require a remedies clause. Similarly, Alabama does not list remedies. It never states what a court may order, but it names proportional ranked-choice and cumulative voting at § 3(b)(1), and § 7(e)(9)–(10) sets the procedure the commission must follow when a municipality implements "a district-based or alternative method of election," on a 20-business-day comment period and a 90-day review. The systems are named and the statute builds administrative machinery around adopting them; nothing forecloses them.

Sources

Enacted: California: Cal. Elec. Code §§ 14025–14032. Washington: RCW 29A.92. Oregon: ORS §§ 255.400–255.424. Virginia: Va. Code §§ 24.2-125–131. New York: N.Y. Elec. Law §§ 17-200–222. Connecticut: Conn. Gen. Stat. §§ 9-368i–9-368q. Minnesota: Minn. Stat. §§ 200.50–200.59. Colorado: Colo. Rev. Stat. §§ 1-47-101–302. Maryland: Md. Elec. Law §§ 15.7-101–107. New Jersey: N.J. P.L. 2026, c. ____ (ACS for A-1715/SCS for S-282); chapter number not yet assigned. Vermont: 17 V.S.A. §§ 2045–2046.

Failed: Florida: SB 1522 (2024). Michigan: SB 401–404 (2024). Missouri: HB 2873 (2024). Illinois: HB 3047/SB 3170 (2025). Texas: HB 5258 (2025). Alabama: HB 486/SB 290 (2026). Arizona: SB 1343 (2026). Georgia: SB 536 (2026). Louisiana: SB 365 (2026). Mississippi: HB 1446/SB 2582 (2026). Oklahoma: SB 1583 (2026). Rhode Island: H 8334/S 3143 (2026).

Exclusion

Illinois (2011). The Illinois Voting Rights Act of 2011 is not counted as an enacted state VRA. It applies only to state legislative redistricting and provides no local government coverage. Most comprehensive SVRA trackers likewise exclude it.

C Districting Simulations

Creating a distribution of feasible districting plans. We use the Sequential Monte Carlo (SMC) redistricting alogrithm proposed by McCartan and Imai (2023) and implemented as an automated redistricting simulator by Kenny et al. (2021). We select this approach for a few reasons. First, it can incorporate contiguity, compactness, and equal population constraints into the estimation process, meaning that it approximates the *particular* distribution of plans that real-world decisionmakers, given the physical and residential geography of their city, can feasibly produce under federal law. To our knowledge this algorithm is the best among currently available methods at approximating this particular distribution that is of substantive interest to us. Second, the algorithm is computationally efficient, scales well, and is easy to implement using the `R` package `redist` (Kenny et al. 2021).

We refer the interested reader to a detailed discussion of the SMC algorithm in McCartan and Imai (2023), presenting only the intuition here. The approach treats the task of assigning m geographic units (for us, Census blocks) to n contiguous council districts as a *graph-cut problem*: partitioning a graph—where nodes represent geographic units and edges between two nodes represent their contiguity—into a set of connected subgraphs, representing districts. The SMC algorithm is then performed to obtain a representative sample of plans from the distribution of valid plans as formulated in this way.

`redist_smc` requires a few key user-defined parameters. The first is compactness, which we set at the default level of $\rho = 1$ for every city.[3] Larger values of ρ correspond to a preference for fewer edge cuts and therefore a redistricting plan with more compact districts.

The second is a value for the maximal deviation from *population parity*—that is, where the city's population is divided evenly among districts—that will be tolerated of any district in a plan. Legislative districting at the federal level is held to a very high population equality standard. In the 1983 case *Karcher v. Daggett*, the U.S. Supreme Court ruled that there is no deviation that could practically be avoided that is too small to potentially violate the "one person, one vote" standard set by Article I, Section 2 of the Constitution. *Evenwel v. Abbott* (2016) provides a useful guideline for state and local redistricting, stating that legislative maps with a maximum population deviation of less than 10% between the largest and smallest districts are presumably consistent with the one-person, one-vote principle (this is equivalent to `pop_tol` = 0.05 in `redist`). At the local level, larger deviations may be necessary to achieve other districting goals, especially in smaller and more sparsely or unevenly populated municipalities.

Absent concrete legal guidance or precedent at the city level, we approach the determination of the maximum tolerable deviation from population parity as an empirical matter. First we compute, for every adopted district plan, the maximal deviation of any district, given by:

$$\max_{1 \leq l \leq n} \left| \frac{\sum_{i \in V_l} p_i}{\bar{p}} - 1 \right| \tag{1}$$

where V_l is a district, n is the number of districts, i is a Census block, p_i is the population in block i from the 2010 Census, and $\bar{p}$ is defined as $\sum_{i=1}^{m} p_i/n$ (where m is the number of blocks). We find that some cities, in particular smaller ones, have very high values—far beyond what is usually tolerated at the federal level—and the overall mean across cities is 0.10. We therefore set the population tolerance parameter as the maximum of 0.05 (equivalent to the *Evenwel* standard) and the city's own adopted map's largest deviation, with the rationale that if a certain deviation was permitted in practice, then any plan with *smaller* deviations would have been fair game as well—

[3] See McCartan et al. (2022), Section 3.3 for further detail on why $\rho = 1$ is recommended.

at least on this dimension. While we cannot know how much *larger* a deviation might have been tolerated, our approach yields relatively conservative target distributions—that is, it may exclude some counterfactual possibilities that were in fact on the table. Still, because the deviations are so high in practice, the algorithm still has a large degree of freedom to explore alternative plans.

Finally, the user is also expected to define the number of samples to draw (`sims`) and, optionally, how many independent parallel runs to conduct (`runs`). We chose to run 5,000 simulations across 4 parallel runs. Thus, we generate 20,000 simulated district plans from a target distribution—5,000 from each of four independent chains—and thin the resulting plans to retain a final sample of 5,000. This aligns with a process the ALARM team (who wrote the `redist` package) typically uses.[4]

Table C-5: `redist` Plan Diagnostics

City	**Districts**	**Runs**	**Min. Eff. Samples (%)**	**Min. Acc. Rate (%)**	**Max. Log Wgt. SD**	**Min. Unique Plans**	**Max. R-hat**	**Plan Diversity (80% Range)**
Anaheim	6	4	44.5	20.5	0.76	2,692	1.001	0.55–0.76
Apple Valley	5	4	98.5	11.0	0.12	2,736	1.000	1.59–1.60
Atwater	4	4	36.7	13.7	0.72	2,735	1.002	0.40–0.70
Banning	5	4	95.5	8.2	0.21	2,696	1.001	1.53–1.57
Barstow	4	4	96.7	9.7	0.18	2,855	1.000	1.32–1.37
Big Bear Lake	5	4	93.3	10.2	0.25	2,704	1.002	1.49–1.56
Buena Park	5	4	52.8	24.4	0.61	2,807	1.004	0.55–0.84
Camarillo	5	4	46.7	27.8	0.60	2,815	1.002	0.65–0.91
Campbell	5	4	54.3	29.2	0.61	2,784	1.003	0.50–0.79
Carlsbad	4	4	49.7	18.6	0.59	2,873	1.002	0.50–0.86
Cathedral City	5	4	46.3	12.9	0.59	2,768	1.001	0.60–0.89
Ceres	4	4	58.4	11.2	0.52	2,913	1.002	0.44–0.72
Chino Hills	5	4	58.5	10.7	0.60	2,710	1.004	0.62–0.90
Chula Vista	4	4	34.6	21.4	0.60	2,821	1.001	0.60–0.87
Citrus Heights	5	4	41.5	20.3	0.60	2,834	1.001	0.61–0.87
Claremont	5	4	94.8	9.7	0.22	2,706	1.001	1.51–1.57
Compton	4	4	99.0	14.5	0.10	2,853	1.001	1.36–1.38
Concord	5	4	53.8	21.5	0.58	2,769	1.003	0.74–0.96
Corona	5	4	48.7	15.5	0.60	2,730	1.002	0.58–0.85
Dana Point	5	4	30.5	10.6	0.68	2,695	1.002	0.47–0.76
Dixon	4	4	44.2	10.2	0.55	2,896	1.002	0.60–0.87
Duarte	7	4	41.7	17.9	0.82	2,511	1.005	0.45–0.70
Eastvale	5	4	93.6	7.7	0.24	2,616	1.001	1.49–1.56
Elk Grove	4	4	28.7	13.3	0.58	2,850	1.005	0.56–0.85
Encinitas	4	4	98.4	11.4	0.12	2,852	1.001	1.35–1.37
Escondido	4	4	98.7	12.4	0.11	2,850	1.001	1.36–1.38
Exeter	5	4	53.4	19.6	0.62	2,711	1.008	0.51–0.84
Fairfield	6	4	42.7	12.8	0.70	2,717	1.004	0.53–0.81
Fontana	4	4	99.2	12.7	0.09	2,835	1.000	1.37–1.38
Fremont	6	4	97.4	14.6	0.16	2,591	1.003	1.76–1.77
Fullerton	5	4	33.6	20.2	0.63	2,797	1.007	0.64–0.90
Garden Grove	6	4	44.7	20.1	0.68	2,756	1.002	0.60–0.88
Glendora	5	4	52.1	11.5	0.57	2,769	1.003	0.71–0.94
Half Moon Bay	4	4	43.4	16.8	0.59	2,768	1.002	0.64–0.91
Hemet	5	4	51.9	9.9	0.61	2,763	1.004	0.62–0.88
Hesperia	5	4	48.6	13.6	0.57	2,791	1.001	0.72–0.95
Imperial Beach	4	4	56.1	17.3	0.49	2,857	1.002	0.69–0.95
Indio	5	4	49.0	13.9	0.64	2,766	1.006	0.67–0.93
Jurupa Valley	5	4	35.6	11.7	0.58	2,807	1.005	0.69–0.94
King City	5	4	54.2	5.3	0.58	2,317	1.004	0.69–0.96

[4] See `https://github.com/alarm-redist/fifty-states/blob/main/R/template/03_sim.R` for an example.

Table C-5: `redist` Plan Diagnostics *(continued)*

City	Districts	Runs	Min. Eff. Samples (%)	Min. Acc. Rate (%)	Max. Log Wgt. SD	Min. Unique Plans	Max. R-hat	Plan Diversity (80% Range)
Kingsburg	5	4	70.2	6.6	0.59	2,540	1.002	0.46–0.74
La Mirada	5	4	46.7	11.5	0.57	2,775	1.001	0.55–0.85
Lake Forest	5	4	96.0	12.2	0.20	2,677	1.000	1.53–1.58
Lemoore	5	4	40.2	12.2	0.69	2,685	1.003	0.45–0.87
Lincoln	5	4	31.8	17.8	0.75	2,733	1.003	0.50–0.82
Lodi	5	4	41.7	17.3	0.58	2,794	1.002	0.71–0.96
Lompoc	4	4	43.5	21.9	0.60	2,839	1.001	0.62–0.89
Los Banos	4	4	54.4	14.2	0.53	2,779	1.002	0.54–0.84
Madera	6	4	44.6	24.4	0.60	2,750	1.004	0.64–0.89
Marina	4	4	62.9	12.7	0.54	2,862	1.002	0.59–0.91
Menlo Park	5	4	91.2	14.3	0.28	2,648	1.000	1.49–1.55
Modesto	6	4	32.7	21.9	0.69	2,689	1.005	0.59–0.84
Monterey Park	5	4	95.7	14.3	0.20	2,746	1.000	1.53–1.58
Morgan Hill	4	4	8.5	10.5	0.77	2,625	1.005	0.57–0.92
Murrieta	5	4	43.6	20.3	0.60	2,799	1.002	0.69–0.94
Napa	4	4	57.0	24.5	0.53	2,848	1.005	0.55–0.85
Novato	5	4	94.8	11.2	0.22	2,571	1.001	1.51–1.57
Ojai	4	4	75.2	21.3	0.44	2,813	1.004	0.65–0.92
Orange	6	4	41.6	23.6	0.71	2,675	1.004	0.60–0.86
Oxnard	6	4	44.1	27.3	0.63	2,689	1.003	0.68–0.91
Pacifica	5	4	47.8	18.9	0.67	2,712	1.003	0.61–0.88
Palm Springs	5	4	44.2	17.9	0.68	2,784	1.003	0.62–0.94
Palmdale	4	4	62.1	9.9	0.54	2,904	1.003	0.46–0.73
Paso Robles	4	4	49.8	11.6	0.60	2,760	1.001	0.48–0.79
Patterson	4	4	58.0	11.0	0.52	2,893	1.001	0.59–0.87
Placentia	5	4	51.1	19.0	0.58	2,784	1.004	0.57–0.82
Porterville	5	4	47.7	25.7	0.61	2,775	1.003	0.68–0.93
Poway	4	4	94.9	11.2	0.22	2,799	1.001	1.29–1.35
Rancho Cucamonga	4	4	37.8	18.8	0.48	2,926	1.002	0.74–0.97
Redlands	5	4	56.5	9.4	0.55	2,798	1.002	0.70–0.96
Redwood City	7	4	51.2	37.9	0.64	2,541	1.004	0.70–0.89
Richmond	6	4	16.1	21.2	0.81	2,624	1.013	0.56–0.80
Rohnert Park	5	4	43.8	26.9	0.64	2,808	1.001	0.52–0.82
Roseville	5	4	38.3	16.8	0.65	2,812	1.003	0.56–0.86
San Rafael	4	4	96.4	9.3	0.18	2,849	1.001	1.32–1.36
Sanger	4	4	97.7	10.0	0.15	2,857	1.001	1.33–1.37
Santa Barbara	6	4	48.7	23.2	0.61	2,684	1.002	0.77–0.98
Santa Clara	6	4	28.3	21.9	0.60	2,787	1.003	0.60–0.87
Santa Maria	4	4	55.4	14.0	0.53	2,868	1.002	0.63–0.91
Santa Rosa	7	4	50.5	21.0	0.61	2,704	1.002	0.70–0.94
Santee	4	4	97.8	8.1	0.15	2,868	1.001	1.33–1.37
Selma	4	4	51.3	8.9	0.54	2,796	1.001	0.49–0.79
Simi Valley	4	4	98.2	13.2	0.13	2,843	1.001	1.36–1.38
Solana Beach	4	4	43.7	12.3	0.54	2,768	1.003	0.49–0.80
South Pasadena	5	4	59.5	10.8	0.52	2,626	1.004	0.64–0.91
South San Francisco	5	4	95.0	10.1	0.22	2,714	1.001	1.53–1.58
Stanton	4	4	93.5	10.1	0.24	2,827	1.001	1.28–1.35
Stockton	6	4	45.5	18.1	0.68	2,686	1.002	0.71–0.93
Sunnyvale	6	4	55.8	22.9	0.58	2,728	1.003	0.71–0.93
Tehachapi	5	4	17.9	0.2	1.24	619	1.030	0.27–0.54
Temecula	5	4	95.2	16.3	0.21	2,641	1.001	1.54–1.58
Torrance	6	4	98.0	14.6	0.14	2,628	1.001	1.75–1.77
Tulare	5	4	98.0	14.2	0.14	2,710	1.001	1.57–1.59
Turlock	4	4	58.0	15.4	0.50	2,907	1.001	0.62–0.89

Table C-5: `redist` Plan Diagnostics *(continued)*

City	Districts	Runs	Min. Eff. Samples (%)	Min. Acc. Rate (%)	Max. Log Wgt. SD	Min. Unique Plans	Max. R-hat	Plan Diversity (80% Range)
Twentynine Palms	5	4	87.2	27.9	0.33	2,675	1.001	1.48–1.54
Union City	4	4	98.4	11.6	0.12	2,851	1.000	1.35–1.38
Upland	4	4	54.4	14.8	0.58	2,845	1.002	0.62–0.90
Vallejo	6	4	38.9	15.0	0.65	2,672	1.003	0.69–0.95
Ventura	7	4	35.8	16.3	0.85	2,625	1.004	0.55–0.79
Visalia	5	4	38.3	21.9	0.51	2,817	1.004	0.74–0.96
Vista	4	4	54.4	17.9	0.53	2,839	1.002	0.51–0.80
Wasco	5	4	36.7	16.5	0.78	2,542	1.003	0.54–0.80
West Covina	5	4	97.5	15.5	0.16	2,695	1.001	1.56–1.59
Westminster	4	4	56.7	16.7	0.54	2,886	1.001	0.47–0.79
Whittier	4	4	47.5	27.1	0.56	2,916	1.002	0.52–0.82
Wildomar	5	4	47.1	17.7	0.61	2,565	1.002	0.56–0.90
Woodland	5	4	36.8	28.0	0.63	2,731	1.004	0.60–0.87
Yucaipa	5	4	49.5	9.2	0.55	2,792	1.006	0.72–0.99
Yucca Valley	5	4	97.2	10.5	0.17	2,756	1.001	1.56–1.59

Diagnostic information from our districting simulations using SMC are presented in Table C-5. For every retained plan, we then compute our two outcomes of interest. Because each simulated plan is simply an assignment of Census blocks to districts, we aggregate our block-level data up to the district level under that plan's assignment. From these district-level quantities we calculate, first, the proportion of the plan's districts whose Latino share of CVAP exceeds 50%, and second, the plan's expected Latino council share, obtained by predicting each district's probability of electing a Latino candidate and aggregating those probabilities across the council. We repeat this procedure for every plan in every city, under observed voting behavior as well as the counterfactual turnout, cohesion, and crossover scenarios described in the main text. Appendix Section D details the construction of both measures.

Optimizing plans for particular measures. Because the SMC sample of plans is not guaranteed to contain the most extreme plans a mapmaker *could* draw, we complement our simulated plans with short-burst optimization (Cannon et al. 2023), implemented by the `redist_shortburst()` function in `redist`. The algorithm runs a merge-split Markov chain for a short "burst" of proposals to identify the best plan according to a user-supplied score function, and restarts the chain from that plan. We retain the package defaults of 10 proposals per burst and 500 bursts per run, initialize each chain at the city's enacted plan, and impose the same compactness parameter and population tolerance used in our SMC runs. Because the merge-split proposal requires a contiguous starting plan, we first repair each city's block adjacency graph using the `geomander` package, adding edges so that geographically disconnected pieces of the same enacted district (e.g., blocks separated by unincorporated land) are treated as connected.

We optimize each outcome separately in every city, supplying `redist_shortburst()` with a custom score function for each. For the share of majority-Latino districts, the score is the fraction of a plan's districts whose Latino share of CVAP is at least 50%:

```
scorer_majority_minority <- function(map, group_pop, total_pop, thresh = 0.5) {
  group_pop <- rlang::eval_tidy(rlang::enquo(group_pop), map)
  total_pop <- rlang::eval_tidy(rlang::enquo(total_pop), map)
  ndists <- attr(map, "ndists")
  fn <- function(m) colSums(redist:::group_pct(m, group_pop, total_pop, ndists) >= thresh) /
  ↪ ndists
```

```
  class(fn) <- c("redist_scorer", "function")
  fn
}
```

For expected Latino council share, the score aggregates each candidate plan's block-level CVAP and proxy-election votes to the district level, applies the logical model of Equation 3 to obtain each district's probability of electing a Latino candidate, and sums these probabilities before dividing by the number of seats:

```
scorer_atsusaka <- function(map, atsusaka_input, coethnic = NULL, crossover = NULL, gap = NULL) {
  ndists <- attr(map, "ndists")
  fn <- function(m) atsusaka_expected_share(m, atsusaka_input, coethnic, crossover, gap) / ndists
  class(fn) <- c("redist_scorer", "function")
  fn
}
```

where `atsusaka_expected_share()` computes, for each plan, $\sum_{l=1}^{n} P_{win,l}$ with M and C constructed from the aggregated district data as described in Appendix D.

We run the optimizer twice per outcome—once maximizing and once minimizing the score—to bound the optimal range from both directions; when the maximized score is zero, we skip the minimization run, since the outcome is bounded below by zero. For expected Latino council share, we repeat this procedure under observed voting behavior and under each counterfactual combination of cohesion, crossover, and turnout described in the main text.

D Predicting Latino Council Share Using Atsusaka's (2021) Logical Model

To translate a district's demographic and behavioral characteristics into a predicted electoral outcome, we use the Atsusaka (2021) logical model of minority candidate emergence and success. A "logical model" in this sense is a parsimonious, deductively derived formula rather than a statistically estimated one: it takes a small number of theoretically motivated inputs and returns a predicted probability. Atsusaka (2021) validates the model's predictive accuracy against two independent datasets—Louisiana mayoral elections (1986–2016) and state legislative general elections in 36 states (2012, 2014)—where it correctly predicts roughly 90% of minority candidate emergence and 95% of minority electoral success, outperforming OLS and logistic regressions fit directly to the data.

Model structure. The model rests on four scope conditions: elections are "biracial," pitting a minority-preferred candidate against a white-preferred candidate; at least one viable minority candidate exists in the eligibility pool regardless of district composition; minority candidates are short-term instrumentally rational, entering races chiefly to win the next election rather than for symbolic or long-run reasons; and district-level candidate emergence is governed by the decision of the single *most viable* minority politician. Under these conditions, Atsusaka (2021) argues that a minority candidate runs if and only if she expects to win, so that the probability of candidate emergence, P_{run}, is modeled as the probability of victory, P_{win}.

The model builds this win probability in three steps. First, it defines the *racial margin of victory*, M, as half the difference in vote share between the top minority- and white-preferred candidates in the most recent comparable election:

$$M = 50 + \frac{1}{2}\left(V_{t-1}^{M} - V_{t-1}^{W}\right) \in (0, 100), \tag{2}$$

which summarizes how minority candidates have fared against white candidates, incorporating the joint effects of turnout, cohesion, and crossover voting embedded in that prior election. Second, because the true future racial margin is unknown, the model bounds it between two logical extremes: M itself (assuming the next election looks exactly like the last), and C, the racial margin implied by the district's minority composition under the limiting assumption of total in-group cohesion and zero crossover. Third, the model takes the geometric mean of M and C (each recentered by adding 50, since the geometric mean is undefined for negative numbers) as the best guess of the future racial margin absent other information, and converts this estimated margin into a win probability using the standard normal CDF, Φ, to account for uncertainty around that guess. Combining these steps yields the model's central equation:

$$P_{win} = \Phi\left((MC)^{1/2} - 50\right), \tag{3}$$

which gives the probability that the district elects a minority-preferred candidate as a function of only two inputs, M and C.

Determining M and C for CVRA cities. Because the cities in our sample are switching from at-large to district elections, there is no prior single-member district race from which to measure M. Instead, we proxy for M using four statewide top-two contests that pitted a Latino against a non-Latino candidate of the same party—Controller and Secretary of State (2014), U.S. Senate (2016), and Lieutenant Governor (2018)—so that differences in support reflect ethnic rather than partisan cleavages.[5] For each simulated district, we aggregate block-level votes cast within its boundaries for the Latino and the leading non-Latino candidate in each of the four races, compute the implied racial margin ($50 + \frac{1}{2}(V^L - V^{NL})$) for each, and average across races to obtain M. This value varies by district (and by simulated plan), since it depends on which blocks a given map assigns to a district.

For C, we use each district's turnout-adjusted Latino CVAP share. We compute city-specific Latino and non-Latino turnout rates from the L2 voter file, averaged over the 2014 and 2016 general elections to reflect the staggered timing of city council elections.

Computing expected Latino council share from district-level probabilities. Equation 3 returns a win probability for the preferred Latino candidate in a single district. We compute this probability separately for every district in every simulated plan. To translate these district-level probabilities into a plan-level outcome, we treat each district as an independent Bernoulli trial with success probability P_{win} and simulate the plan's overall Latino council share via Monte Carlo: for each simulated plan, we draw whether each district elects a Latino councilmember according to its P_{win}, sum the number of districts with Latino winners, and divide by the total number of council seats. Repeating this 10,000 times per plan and averaging yields the plan's expected Latino council share.

Analyses with counterfactual turnout, cohesion, and crossover values. The counterfactual analyses in the main text (closing the turnout gap; varying cohesion and crossover) enter this same framework by altering C and M, respectively. Closing the turnout gap sets C equal to the raw Latino CVAP share. We compute M under counterfactual cohesion and crossover values according

[5] The pairings, all Democrats, are: John Pérez vs. Betty Yee (Controller, 2014); Alex Padilla vs. Leland Yee (Secretary of State, 2014); Loretta Sanchez vs. Kamala Harris (U.S. Senate, 2016); Ed Hernandez vs. Eleni Kounalakis (Lieutenant Governor, 2018).

to the equation:

$$M = 50 + \frac{1}{2}\big(V^L - V^{NL}\big), \tag{4}$$

where $V^L = \big(\rho \cdot \text{cohesion} + (1-\rho) \cdot \text{crossover}\big) \cdot 100$ and $V^{NL} = 100 - V^L$, and ρ represents Latino CVAP share.

Share of majority-Latino districts as an alternative measure. We aggregate the block-level citizen voting-age population estimates attached to our enhanced shapefiles up to the district level, summing each block's Latino and total citizen voting age population (CVAP) according to the plan's assignment of blocks to districts. A district's Latino CVAP share is its Latino CVAP divided by its total CVAP, and we classify a district as majority-Latino when this share exceeds 50%. The plan-level outcome reported in the main text is the proportion of a plan's districts that are majority-Latino. In comparison to the expected Latino council share measure listed above, this outcome measure requires no behavioral assumptions. We thus use the share of districts that are majority-Latino as an alternative measure to benchmark what districting can achieve based on a city's residential geography alone.

E Modeling Alternative Institutions

In simulating elections under each system, we assume a two-bloc, two-slate setup. That is, we assume a city is made up of Latino and non-Latino voters and there are Latino and non-Latino candidates. For each city, we run 500 simulations (`n_sims`) in which 1,000 ballots (`n_voters`) are generated in each simulation.[6] For all three systems, we provide a series of parameters that are tailored to the electoral context of the city whose elections are being simulated: number of elected candidates, number of Latino and non-Latino candidates, proportion Latino CVAP, turnout-adjusted proportion Latino CVAP, then Latino and non-Latino cohesion and crossover. Because elections are staggered, we specify the number of seats based on a fraction of the total number of seats on the city council. If there is a five-member council, we conduct an election where two candidates are elected and another where three are elected.

The next two parameters, `num_latino_cands` and `num_nonlatino_cands`, are determined using CEDA election records from the three at-large elections prior to the switch to district elections. We use Bayesian Improved Surname and Geocoding (BISG) implemented in the `wru` R package (Khanna et al. 2024) to probabilistically assign each candidate a race/ethnicity, then sum the predicted probabilities across candidates in each election year to estimate the number of Latino and non-Latino candidates per election. We then take the average of these counts grouped by the number of candidates elected in each contest (i.e., 2, 3, or 4) to determine the values for these parameters for each contest type (i.e., by each value of `num_elected`), which are replicated as needed to cover all council seats. For the purposes of simulations, we assume that each group in each city will have at least 1 candidate. To be consistent with our district simulations, we use the turnout-adjusted Latino CVAP share to assign values of the `prop_latino` parameter.

Estimates of racial cohesion and crossover are assumed across the same counterfactual values implemented for our district simulations: 60%, 80%, and 100% of Latinos supporting the Latino candidate—and three values of crossover—20%, 30%, and 40% of the city's non-Latinos supporting the Latino candidate. The cohesion and crossover parameters dictate the degree to which voters in these simulations tend to support each slate of candidates. Voters' preferences may vary over candidates within a slate. For example, Latino voters may coalesce around a single Latino candidate or be divided in their support across multiple Latino candidates. To capture this variation, Benade

[6] This is consistent with the simulations run by Benade et al. (2021).

et al. (2021) add candidate-strength parameters. They denote these parameters as α_{AB}, which indicates the division of support from group A for candidates of group B. In our two-bloc, two-slate setup, this means that we have four parameter values to set: α_{LL}, α_{LN}, α_{NL}, α_{NN}, where L indicates Latino candidates and N indicates non-Latino candidates. Setting these parameters with the same values set by Benade et al. (2021) creates four scenarios for which to run simulations:

- **Scenario A** ($\alpha_{LL} = 0.5$, $\alpha_{LN} = 0.5$, $\alpha_{NL} = 0.5$, $\alpha_{NN} = 0.5$). All voters agree on the rank order within the slates of Latino (L) candidates and non-Latino (N) candidates.
- **Scenario B** ($\alpha_{LL} = 2$, $\alpha_{LN} = 0.5$, $\alpha_{NL} = 0.5$, $\alpha_{NN} = 0.5$). All voters agree on the rank order of N, and all non-Latino voters agree on the ordering of L, but Latino voters randomly vary their preference order of L.
- **Scenario C** ($\alpha_{LL} = 2$, $\alpha_{LN} = 2$, $\alpha_{NL} = 2$, $\alpha_{NN} = 2$). All voters randomly order both slates on their ballots.
- **Scenario D** ($\alpha_{LL} = 0.5$, $\alpha_{LN} = 0.5$, $\alpha_{NL} = 2$, $\alpha_{NN} = 2$). All the Latino voters agree on the rank order for both slates, but non-Latino voters randomly vary the order for both slates.

Under cumulative voting, voters in each city can allocate as many points as there are seats up for election. In most of our cities, where 2 or 3 seats are on the ballot in an election year, that means voters can allocate 2 or 3 points, respectively. To simulate an election under cumulative voting, the parameters defined above are used to generate a preference profile—a collection of ballot types, where each ballot type records how a voter allocates their points across candidates and a weight equal to the number of voters who cast that allocation. This preference profile, along with `num_elected`, is then passed to a function that determines the winners of the election in each simulation. For each simulation, we take the total number of Latino candidates elected across the city's elections and divide by the total number of seats on the city council to get the simulated Latino council share.

Under limited voting, voters are able to select fewer candidates than the number of seats up for election. In our simulations, we assume that voters have one fewer vote than the number of seats up for election, and they can only give one vote per candidate — mirroring how limited voting systems have been implemented in U.S. local elections in practice. For example, in an election where 3 seats are up for election, voters can select 2 candidates. Thus, the process for simulating elections under limited voting differs from cumulative voting in how ballots are generated: each voter casts one vote for each of their top k distinct candidates, taken from the same Plackett–Luce rankings used in our single transferable vote simulations which are described in the next paragraph.

Again, given the context of our study, we implement single transferable vote (STV) in our simulations. We implement the `votekit` defaults that (1) the Droop quota of $\lfloor \frac{N}{m+1} \rfloor + 1$ is the threshold for election, where N is the number of voters and m is the number of seats up for election, and (2) a fractional, rather than random, transfer of votes is used (all ballots that can be transferred are assigned a new weight according to the share of votes for the elected candidate that were in excess of the threshold). Benade et al. (2021) offer four models of voter ranking behavior. We implement the Plackett–Luce (PL) model in our simulations, where a ballot is probabilistically filled one position at a time by drawing from the slates according to the preference profile weight. PL is thought to simulate "impulsive" voter behavior, where voters fill out a ballot in one shot without looking back over the whole ranking.

Figure E-1 shows that results are substantively similar across all four candidate-strength parameters and the three cohesion/crossover combinations that constitute our main analysis. The bottom panel, shown for reference, validates that the systems do not produce outcomes above proportionality when there is fully racially polarized voting (zero crossover).

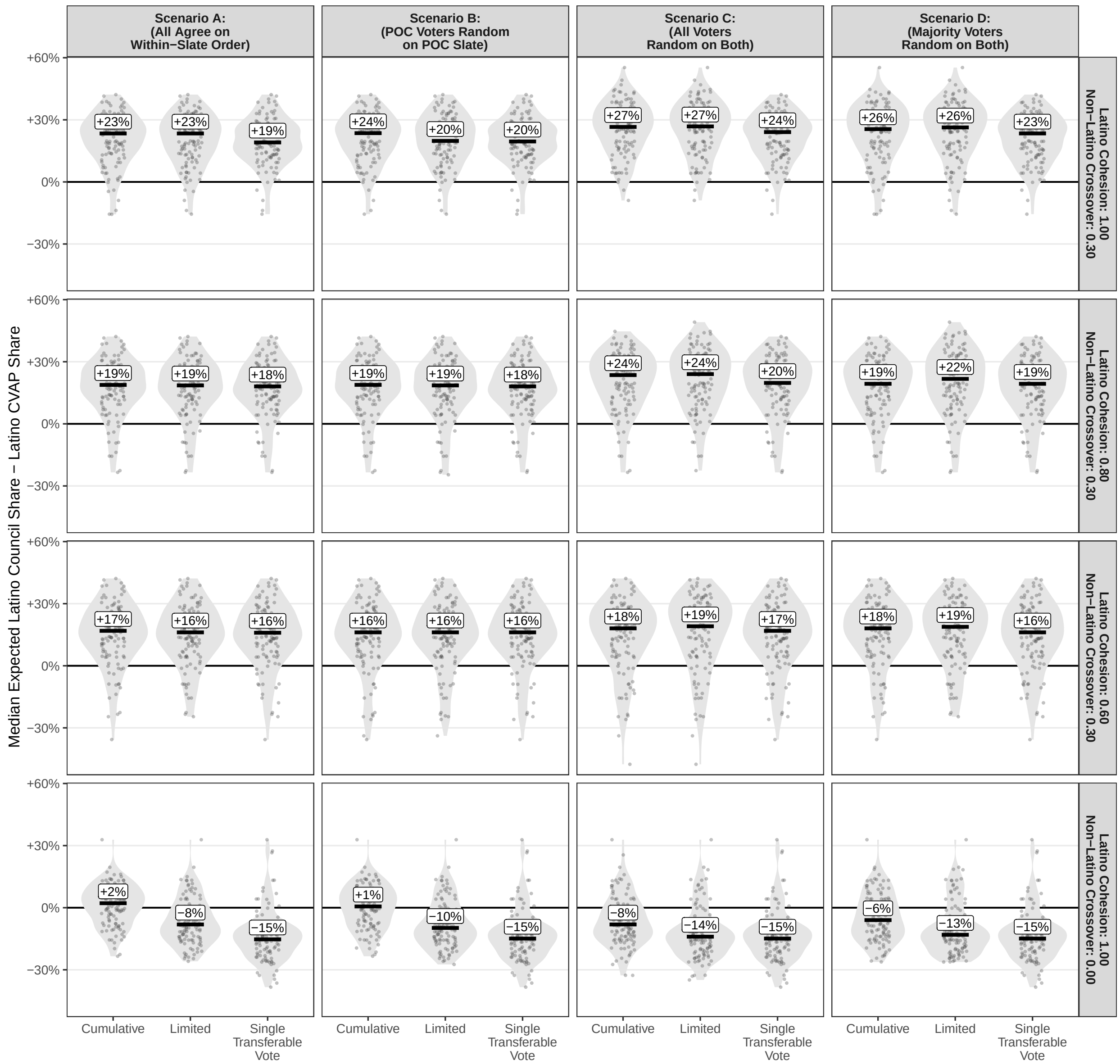

Figure E-1: Relationship between electoral system and Latino descriptive representation under varying levels of Latino cohesion, non-Latino crossover, and within-bloc coordination on candidates.

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