Appendix for Redrawing Democracy: Quantifying House District Continuity and Change, 1789-2024

Contents

A1 Sources

District shapefiles for the 1st through 114th Congress (1789-2012) come from Jeffrey B. Lewis, Brandon DeVine, Lincoln Pitcher, and Kenneth C. Martis. (2013) Digital Boundary Definitions of United States Congressional Districts, 1789-2012. [Data file and code book]. Retrieved from https://cdmaps.polisci.ucla.edu on 1.30.24. The Lewis et al dataset is compiled by aggregating complete county shapes from the National Historical Geographical Information System (NHGIS) project and the Newberry Library Atlas of Historical County Boundaries (district boundaries that did not coincide with county boundaries were constructed on a district-by-district basis). I removed geometries describing Indian territories.

District coordinates for the 115th, 116th, 117th, and 118th congresses (2013-2024) were taken directly from the U.S. Census Bureau's TIGER/Line Shapefiles. Retrieved from https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.html on 1.30.24. The series is co-aligned across the full time period 1789-2024 because Lewis et al utilized U.S. Census Bureau TIGER/Line Shapefiles to construct their district boundary files from the 103rd through 114th congresses. Coordinates in the Tiger/Line Shapefiles have six decimal places, though the Census Bureau warns that the positional accuracy of the coordinates may not be as great as the six decimal places suggest in situations where feature changes have been made by field staff or digital sources.

Demographic data were taken from the decennial census. Data from the Founding up to 1990 census were from the U.S. Census Bureau's Historical Census Statistics on Population Totals by Race, 1790 to 1990, and by Hispanic origin, 1970 to 1990, for the United States, Regions, Divisions, and States. Retrieved from https://www.census.gov/library/working-papers/2002/demo/POP-twps0056.html on 2.14.24. Data from the 2000, 2010, and 2020 censuses were retrieved using the U.S. Census Bureau's API with the following calls: https://api.census.gov/data/2000/dec/sf1?get=NAME,P003001,P003003,P003004&for=state:*; *https://api.census.gov/data/2010/dec/sf1?get=NAME,P003001,P003002,P003003&for=state:*; https://api.census.gov/data/2020/dec/dp?get=NAME,DP1_0076C,DP1_0078C,DP1_0079C&for=state:* on 2.14.24.

The only race variables available from the Founding to present day are 'White' ('Free White Females & Males' in the 1790-1840 censuses), and 'Black' ('Slave' in the 1790, 1800, 1810 censuses; 'Slaves' and 'Free Colored Persons' in 1820, 1830, and 1840; 'Black', 'Mulatto', 'Quadroon' or 'Octoroon' from 1850 through 1920; and 'Black', 'Negro', or 'African American' from 1930 onwards). 'Mexican' appeared in the 1930 census, and the 'Hispanic' ethnic category was added only for the 1970 census onwards. As the variety of labels in the foregoing list illustrates, these constructed categories should be compared with caution. Data is state-level (district-level data from the American Community Survey is available only from 2005).

Party data were taken from Currently Serving Members of Congress and Historical Members of Congress datasets at https://github.com/unitedstates/congress-legislators. This database is maintained by both manual edits by volunteers and automated imports from a variety of sources including GovTrack.us; The Congressional Biographical Directory; Congressional Committees, Historical Standing Committees dataset by Garrison Nelson and Charles Stewart; Martis's "The Historical Atlas of Political Parties in the United States Congress" via Rosenthal, Howard L. and Keith T. Poole, United States Congressional Roll Call Voting Records, 1789-1990; The Sunlight Labs Congress API; The Library of Congress's THOMAS website; and C-SPAN's Congressional Chronicle.

Electoral data were taken from the Election Data Archive's Constituency-Level Elections Archive (CLEA) Lower Chamber Elections Archive at https://electiondataarchive.org/data-and-documentation/clea-lower-chamber-elections-archive/: Kollman, Ken, Allen Hicken, Daniele Caramani, David Backer, and David Lublin. 2020. Constituency-Level Elections Archive. Produced and distributed by Ann Arbor, MI: Center for Political Studies, University of Michigan. Retrieved on 4.30.24. This repository contains detailed results for each candidate/party, total votes cast, number of eligible voters etc, for each constituency cast in legislative elections around the world. Data for this project come from Release 17 (April 19, 2024: 20240419).

A2 Notes on measurement of district change

A2.1 Identifying predecessor and successor districts.

Since some states engage in wholesale renumbering as well as shifting district boundaries, district numbering cannot pinpoint successor districts. Measuring the extent of overlap can also mislead in cases where a very large district borders a small district, and the small district shifts location: the larger neighboring district might be identified as the successor district to the small one. A more natural assessment would be that the small district has shifted rather than morphed into a vast one, especially when the larger neighbor also persists through time. I identify the nearest lineal successor as the district with at least some overlap with the predecessor district and the shortest distance between geographical centroids. The centroids are the geographic centers of each district. Identification of successor districts is constrained by state, with the operation performed consecutively for each state's districts so that successor districts cannot come from other states even if their centroids lie close to the centroid of a district in a neighboring state.

To illustrate, consider Arizona's 1st District, whose most natural successor in the 2020 cycle was the 2nd

District (Figure A1). The designation of the 2nd District as spatial successor district to the 1st is uncontroversial – even though the districts were renamed – as both cover the same north-eastern portion of the state, a rural area that includes 12 Indian reservations.

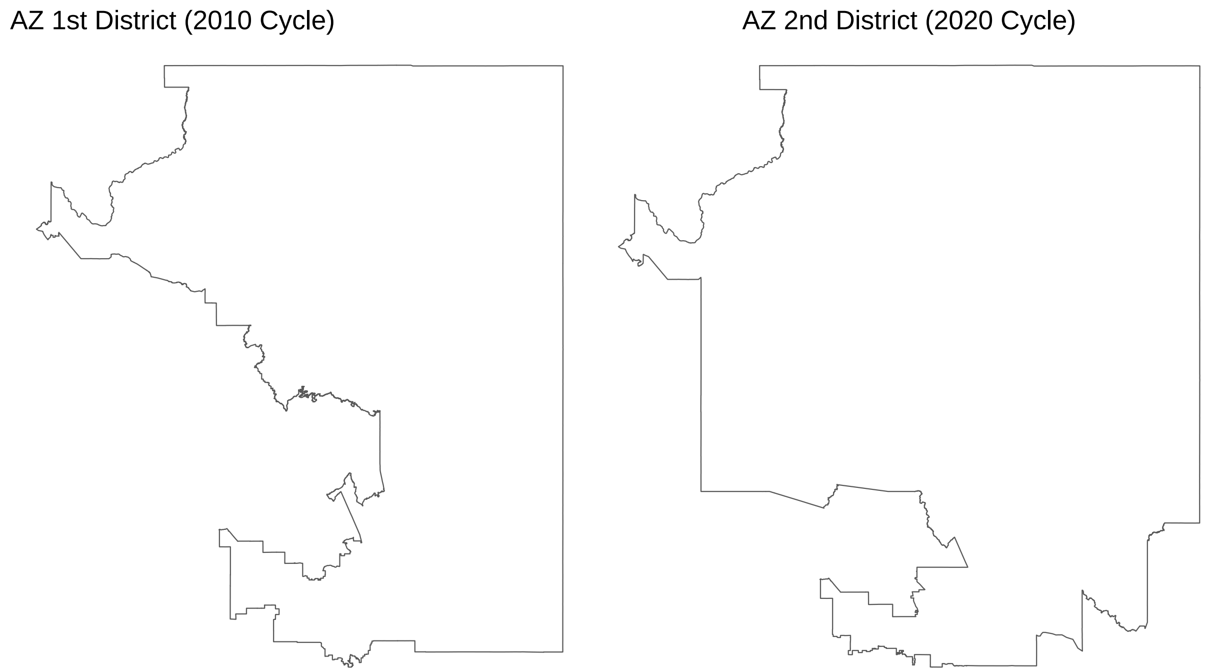

Figure A1: Predecessor and Successor Districts, Arizona (2020 Cycle)

More contestable designations of predecessor-successor combinations arise when smaller districts are elongated in shape, including some urban majority-minority districts and especially in states with anemic population growth that lose seats during reapportionment. For instance, consider Michigan's Detroit-based districts, which have undergone many spatial changes through successive redistricting cycles (Figure A2). Prior to the 1990 cycle, the 13th District included Downtown Detroit and several portions of the southwestern suburbs of the city. Michigan, which has lost at least one seat in every congressional apportionment since 1960, renumbered the VRA-protected district as the 15th in the 1990 cycle. With further losses of population, the district shifted again in the 2000 cycle and the most natural spatial successor was named the 13th District, encompassing much of south Detroit and portions of Grosse Pointe (which had also been part of the 1980-cycle 13th District).

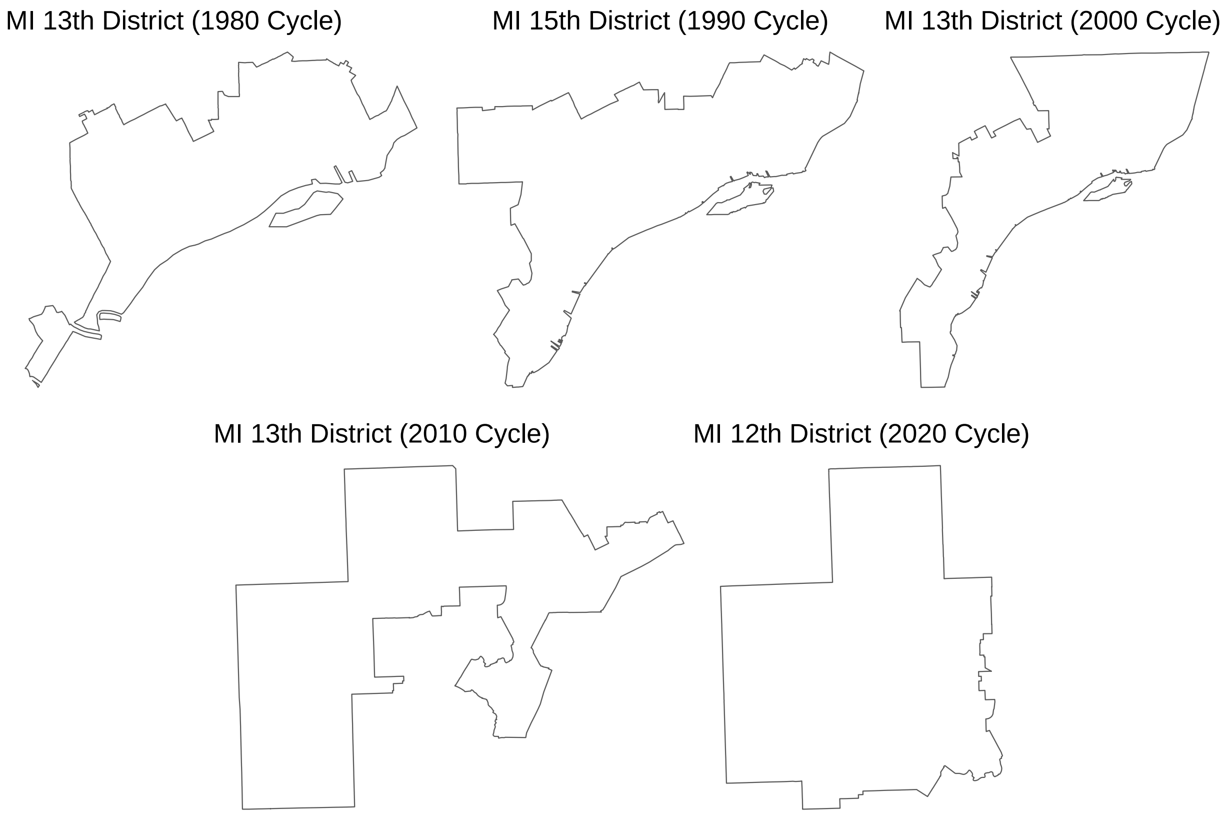

Figure A2: Predecessor and Successor Districts in Detroit, Michigan (1980-2020)

Detroit's dramatic population loss brought further changes to district geography in the 2010 cycle. Democrats brought suit alleging Republican gerrymandering of the 9th, 12th, 13th, and 14th congressional districts, adducing emails from Republican aides that suggested ways to "cram ALL of the Dem garbage in Wayne, Washtenaw, Oakland and Macomb counties into only four districts" – but these lawsuits were ultimately dismissed. The spatial successor to the 2000-cycle 13th District snaked from central Detroit towards Westland and encompassed Detroit Metropolitan Airport. When the 2020 cycle brought further population loss, the 12th District – which lost its suburban and Ann Arbor portions and was recentered upon Detroit – geographically succeeded the 13th District as it covered similar portions of territory, yet the overall shape had changed substantially as shown in the bottom right panel of Figure A2.

There are alternative ways to measure the relationships between predecessor and successor districts, including the proportion of the population shared between predecessors and successors, but MAPS scores are exclusively *spatial* measures. Legislative districts are inherently spatial units, defined by their shape, boundaries, location, and spatial continuities rather than shifting – and sometimes highly mobile –aggregations of voters.

A district's spatial footprint determines its successor more reliably than transient population composition, particularly because spatial measures are inherently visible whereas population data are not. Legislators, commissions, and courts use maps to redistrict, scanning the visual qualities of the district (a process colloquially known as 'the eyeball test') in making judgments about where to place the lines, and assessing allegations of gerrymandering. Traditional districting principles enshrined in state constitutions – such as compactness, contiguity, and respect for local jurisdictional boundaries – reinforce the legal importance of the spatial approach.

Space has always been crucial to systems of representation. Voters who reside in a particular district share not only political representation but also physical and economic landscapes, and the policy concerns to which they give rise, whether agricultural interests in rural areas or transit concerns in urban ones. Native Americans have distinctive historical, cultural, and spiritual connections to place, but settlers in colonial times and in the years following the Founding also valued spatial systems of representation rooted in particular geographical areas. Prior to the development of modern transportation systems, the benefits of propinquity – closeness in space – were crucial for political engagement; even today, geographically coherent districts share access to local news sources, infrastructure, transportation networks, and regional economies.

A2.2 Calculating the MARGIN measure.

To measure the proportion of each district boundary that overlaps with the successor district boundary, I transform the boundaries of each district to a common projection (Universal Transverse Mercator) based on each state's coordinate reference system zone, which ranges from 5 for Hawaii, 10 or 11 for most West coast states, to 18 for states located on the East coast. The reference frame for the coordinates is the commonly-used World Geodetic System 1984 (WGS84). Using the UTM projections minimize distortion for each state's geographical area. I segmentize the boundaries into 20 meter portions, then create concave hulls around the boundaries to remove small indentations so that the measures can cope with complex coastal district boundaries. I then buffer the boundaries to provide a small (250 meter) margin of error when comparing the intersecting portion of boundaries. This prevents very minor geographical shifts or data noise from interfering with the process of matching predecessor and successor district boundaries.

I calculate the portion of the predecessor district's boundary that lie within the buffered boundary of the successor district and vice versa. I then calculate the total length of the overlapping boundaries and divide this by the total boundary lengths of both the predecessor and successor districts to get the Margin measure: how much of the total boundary is shared between the predecessor and successor districts. By calculating the overlapping boundary as a proportion of the sum of the predecessor and successor boundaries, rather than just of the predecessor district's boundary, I give equal treatment to both expansion and contraction and avoid inflating the degree of continuity where much of the existing boundary is retained but there is an added protuberance that makes the successor district's boundary much longer and substantially less regular. By design, the margins change measure incorporates all of the district boundaries. I do not exclude those portions of district boundary that coincide with the state border. Since state boundaries do not change, a district located at the edge of a state (a portion of whose border is fixed) may be less changeable on this metric than districts whose boundaries do not form part of the state border.

A2.3 Calculating the ALIGNMENT (effective districts) measure.

Each state is first assigned to the correct UTM zone to ensure accurate area calculations. I calculate the area of the overlapping portion of the geometries of each district, p, at *t1* and all the districts $\{s\}$ with which p overlaps at time *t2*. Next, I identify and calculate the area of the intersections between all the overlapping portions of district and both the predecessor districts, $\{p\}$ (to capture areas of district removed from the original district, p, and added to a different district, *s2* at *t2*), and the successor districts, $\{s\}$ (to capture areas added to each district, p, that used to belong to a different district, *p2* at *t1*). I set a very small buffer distance of 0.0000001 around each polygon to control the sensitivity of the intersection operation, so that even if geometries do not align perfectly they still intersect if they are sufficiently close.

For each designated predecessor and successor district combination, *p,s* (identified as the district, s, with at least some spatial overlap with p and the shortest distance between internal points), I calculate the combined area of the predecessor and successor district and find the proportion of the combined area of the predecessor/successor combinations represented by each overlapping part at *t2*. I square and sum these values for each district, p, at *t1*. The 'effective number of districts' is 1 divided by the summed squared values for each district, p, at *t1*. Unlike the Margins, Size, and Position measures, the effective districts measure of Alignment does not require the prior designation of predecessor and successor districts. This feature helps distinguish this measure from the more basic Size measure, for instance, which simply identifies the ratio of the designated successor district area to that of the predecessor district. Freeing the effective districts measure from reliance upon a single designated successor district helps capture the size and importance of different overlapping segments of district and the evenness or unevenness of shape changes.

A2.4 Calculating the SIZE measure.

Each state is first assigned to the correct UTM zone to ensure accurate area calculations. I use the log of the ratio of the successor to the predecessor district area to calculate changes in size, rather than the ratio of the intersecting section to the predecessor district area, because the intersecting section is used in the calculation of the effective districts measure. Hence the size measure of change is not bound to a particular geographical location, as the effective districts measure is, but simply compares the relative size of predecessor and successor district. Size changes have not always been zero-sum. In modern times, size changes have a constant sum within a state, but during the Eras of Spatial Representation and Shifting Apportionment the murder and expropriation of Native Americans allowed districts to extend into new areas within states.

A2.5 Standardization of MAPS scores.

The MAPS measures are standardized for interpretability. Each measure is standardized according to the maximum and minimum value it could possibly assume in a given district and state. *Margin* everywhere runs from 0 to 100: the percentage of district boundary that does *not* overlap with the designated successor district boundary. *Alignment* takes a minimum value of 1 – if a district overlaps precisely with one and only one successor district – and a maximum value of the total number of districts in a specified state. I take the logarithm of the district count to reduce the impact of the skewed distribution of seats across states. *Position* takes a minimum value of 0 and a maximum value of the longest stretch in meters between the geographic centroid of a given district and the perimeter of the state which contains that district. *Size* takes a minimum value of 0 and a maximum value of the total size of a given state as it existed in each congress, including Indian territories.

A2.6 Dealing with invalid geometries.

Almost all of the district geometries described in the TIGER/Line shapefiles are valid, but a few invalid geometries needed correction prior to performing spatial operations. Not all districts are contiguous and some contain irregular coastlines, holes (as created by districts containing islands), or other topological issues that rendered the geometries unsuitable for processing using the sf package. Before processing, I identified any invalid geometries and removed self-intersections, corrected invalid ring orientations, removed unnecessary vertices, and resolved other minor topological inconsistencies.

A2.7 Dealing with secession.

Between December 1860 and June 1861, Alabama, Arkansas, South Carolina, Florida, Georgia, Mississippi, North Carolina, Texas, Virginia, Louisiana, and Tennessee seceded from the Union and formed the Confederacy. This secession disrupted the designation of predecessor and successor districts for the 36th, 37th, and 38th Congresses because not all predecessor districts had successors: some of these states' Representatives withdrew, while others did choose House members but later elected Representatives to the Congress of the Confederate States instead. Hence I remove all Confederate states from the calculation of district change for the 36th to 37th, and 37th to 38th Congresses.

A2.8 Dealing with non-contiguous portions of district

A very small number of districts have consisted in two or more non-contiguous portions for brief periods in history. For instance, New York's 2nd and 3rd Districts featured two approximately equal-sized portions of district during the 8th, 9th, and 10th Congresses, leading to duplicate rows in the change measures dataset. I took only the first of the duplicate rows so that each district has just one row per congress.

A3 Correlations between MAPS measures.

Table A1 shows the correlations between the measures of change at the district level.

Table A1: Correlations between MAPS measures of change, 1789-2024, district level

	Margins	Alignment	Position
Margins	1		
Alignment	0.553	1	
Position	0.369	0.235	1
Size	0.367	0.241	0.264

A4 MAPS Measures and Electoral Volatility

Which of the MAPS measures is the best remedy for the 'standardless morass' of low-change maps? One test courts and mapmakers can follow is to examine the relationship between spatial and electoral change, because changing party fortunes and electoral volatility have always been central in redistricting, and are crucial for democratic representation and accountability more broadly. To quantify the extent of change in voter support for political parties across elections I calculate the Pedersen Index of Electoral Volatility and model the relationship between the four MAPS measures and electoral volatility in each district between the election immediately prior to the seating of a congress and the election immediately after the seating of that congress (e.g. for spatial changes taking place between the 60th Congress, which sat from December 2, 1907 to March 3, 1909, and the 61st Congress, which sat from March 4, 1909 to March 3, 1911, the Pedersen Index measures the net change in the party system resulting from individual vote transfers between the House elections held in November 1906 (with some special elections in 1907) and those held in November 1908). I calculate the Pedersen Index for every district from the 1st Congress (1789-1791) to the 118th Congress (2023-2025).

$$V_t = \frac{1}{2} \sum_{i=1}^{n} |v_{i,t} - v_{i,t-1}|$$

V_t is the Pedersen index for year t. $v_{i,t}$ is the vote share of party i in year t. $v_{i,t-1}$ is the vote share of party i in the previous election. n is the number of parties. High values on the Pedersen index indicates a dynamic political environment with significant shifts in voter support between parties; low values indicate stable voter support for the parties between elections.

For each predecessor-successor district combination I calculate the vote shares of each party in the elections for each congress. A few alterations to the House elections data were needed to match all election dates to the relevant congress and calculate the electoral volatility and Republican vote share change for each predecessor-successor district combination. The allocation of congresses to elections is relatively simple for modern congresses, but more challenging for eighteenth- and nineteenth-century congresses because states held elections on varying schedules. States that held elections late in a congress (either because they had recently been admitted or readmitted to the union or for other, idiosyncratic reasons) are allocated manually to the correct congress. For instance, North Carolina and Rhode Island held late elections for the 1st Congress in 1790; Maryland for the 28th Congress in 1844; and Oregon for the 35th Congress in 1858). At-large multi-member districts with no clear successor districts are removed.

Almost all single-member districts match cleanly: one election per congress per district. Of more than 36,000 predecessor-successor district combinations just 10 have multiple elections per district per congress, all of them in the nineteenth century. New York had an unusual arrangement from 1805 to 1809 as its 2nd and 3rd districts were geographically divided but the state passed special legislation to amalgamate elections for these two districts: the two representatives were elected on a general ticket (a device to ensure Democratic-Republican victory). The two representatives elected in 1804 resigned their seats to take other positions so fresh elections were held in 1805. Since the vote share of the top two vote getters on the general ticket is very similar – as is the vote share of the losing parties – I allocate one winner and one loser to each district as if they were single-member districts. Multiple elections were also held in New Hampshire's at-large district in 1810 and 1811; New York's 6th District in April and December 1812 (as its incumbent resigned to fight in the War of 1812); Vermont's 2nd and 3rd districts in 1820 and 1821 (since the required majority was not achieved on the first ballot in these two districts); Maine's 1st, 3rd, 4th, and 6th districts had up to four elections in a single year in 1823 for the same reason; and Missouri's 3rd district in 1852 and 1853. For each district where there were multiple elections for a single congress, I take the mean vote share of each party for the elections held during a single congress to calculate the Pedersen Index for that congress.

The index theoretically ranges from 0 (no volatility; no parties gained or lost any vote share) to 1 (maximum volatility; all parties from the previous election were reduced to zero votes). Figure A3 is an histogram showing the distribution of Pedersen Index scores across all districts since the Founding. As we would expect, most districts have low levels of volatility (the median Pedersen Index score is 0.05, with just 4.7% of predecessor-successor district combinations posting scores above the third quartile).

The Pedersen Index indicates overall electoral volatility. To capture changes in a specific party's fortunes I also model the relationship between each MAPS measure and the absolute change in the Republican vote share between the election immediately prior to the seating of a congress and the election immediately after the seating of that congress (e.g. for spatial changes taking place between the 104th Congress, which sat from January 4, 1995 to October 4, 1996, and the 105th Congress, which sat from January 7, 1997 to December 19, 1998, the change in the Republican vote share variable is the difference in absolute terms between the vote share gained by the Republicans in each district in the House elections held in November 1994 and November 1996). Since the Republican Party has existed only since the 1850s, the Republican vote share model ranges from the 34th Congress (1855-1857) to the 118th Congress (2023-2025).

Matching elections to each predecessor-successor district combination, I use linear regression with election level fixed-effects to model the relationship between MAPS change and the level of electoral volatility at the district level. More spatial change is generally associated with greater electoral volatility, but the

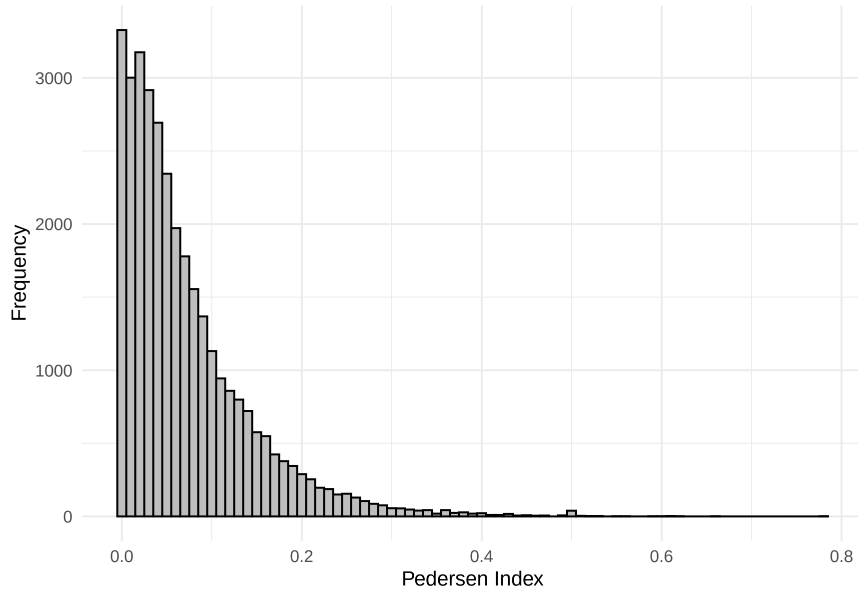

Figure A3: Distribution of Electoral Volatility across all Predecessor-Successor District Combinations since 1789

Margin measure is the clear winner: it has a statistically significant positive relationship with both electoral volatility generally and Republican vote share specifically. Table A2 displays the results of linear regression with election-level fixed effects.

Table A2: Relationships between MAPS Measures, Electoral Volatility, and Republican Vote Share: Linear Regression Results

	Electoral Volatility		Republican Vote Share Change	
Variable	Estimate	Std. Error	Estimate	Std. Error
Margins	0.0067540	0.0092594	0.0016549	0.0014638
Alignment	0.0007254	0.0043278	0.0010300	0.0009722
Position	0.0003675	0.0180749	0.0015494	0.0025271
Size	-0.0002714	0.0011838	0.0009973	0.0012762

The relationship between spatial and electoral change is not surprising but examining the magnitude of the effect for each MAPS score across all districts since the Founding helps resolve the 'standardless morass' courts face in assessing redistricting schemes. Although the models have very similar adjusted R^2, there are differences between the MAPS measures in coefficient size. When the Pedersen Index is the dependent variable, the largest coefficient is the *Margins* MAPS measure of boundary change; when Republican vote share change is the dependent variable, the *Position* MAPS measure of location change has a slightly larger coefficient, but the *Margin* and *Alignment* measures are also statistically significantly associated with Republican vote share change. All of the MAPS measures allow us to calibrate the degree of district change across space (between districts in different states) and time (since the Founding), but the Margin score of boundary change emerges as the best measure of district change because it has the strongest association with changing party fortunes and electoral volatility.

A5 MAPS Measures and Compactness

We already have dozens of compactness measures, including Polsby-Popper, Reock, x-symmetry, Convex-Hull, and recent measures that deploy machine-learning techniques (Kaufman, King, and Komisarchik 2021; Fryer and Holden 2011; Altman 1998; Horn, Hampton, and Vandenberg 1993; Polsby and Popper 1991). Unlike compactness scores, which are typically used to identify bias and flag gerrymanders, MAPS scores encompass a broader array of change patterns and do not convey any normative ideas about the desirability of specific district shapes. Change *qua* change is neither good nor bad but conveys important information about how previous eras have understood representation; when and how redistricting became institutionalized; and competing visions of how the body politic should be constituted. Unlike compactness scores, which are typically used for comparative statics – comparing the relative compactness of dozens of simulated or actual plans – MAPS describes dynamic changes over time in the margin, alignment, position, and size of districts.

A5.1 Compactness by Congress.

For comparison I measure the compactness of every district from 1st to 114th Congress using Polsby-Popper, Reock, and Convex-Hull scores. Figure A4 displays the average district Polsby-Popper score by Congress; Figure A5 displays average Reock scores by Congress; and Figure A6 displays average Convex-Hull scores by Congress. All show a clear pattern of increasing compactness from the Founding until the 1840s.

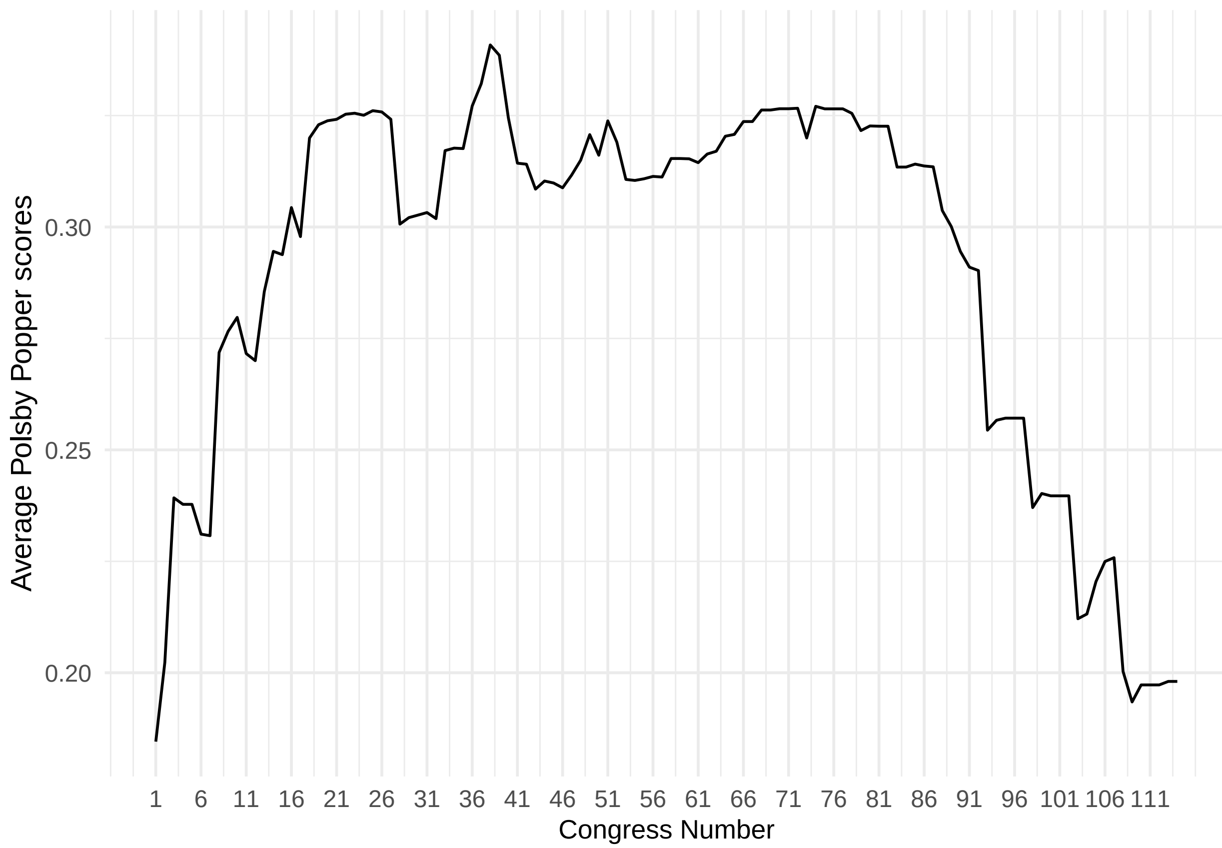

Figure A4: Average District Polsby-Popper Compactness by Congress, 1789-2012

Convex-Hull scores peaked in the late 1830s (Figure A6), while Polsby-Popper and Reock scores peaked in the aftermath of the Civil War (Figure A4 and Figure A5).

Figure A5: Average District Reock Compactness by Congress, 1789-2012

There followed a sustained period of relatively high compactness until the Warren Court entered the political thicket with *Baker v Carr* and districts became rapidly and substantially less compact as states implemented the one-person-one-vote standard.

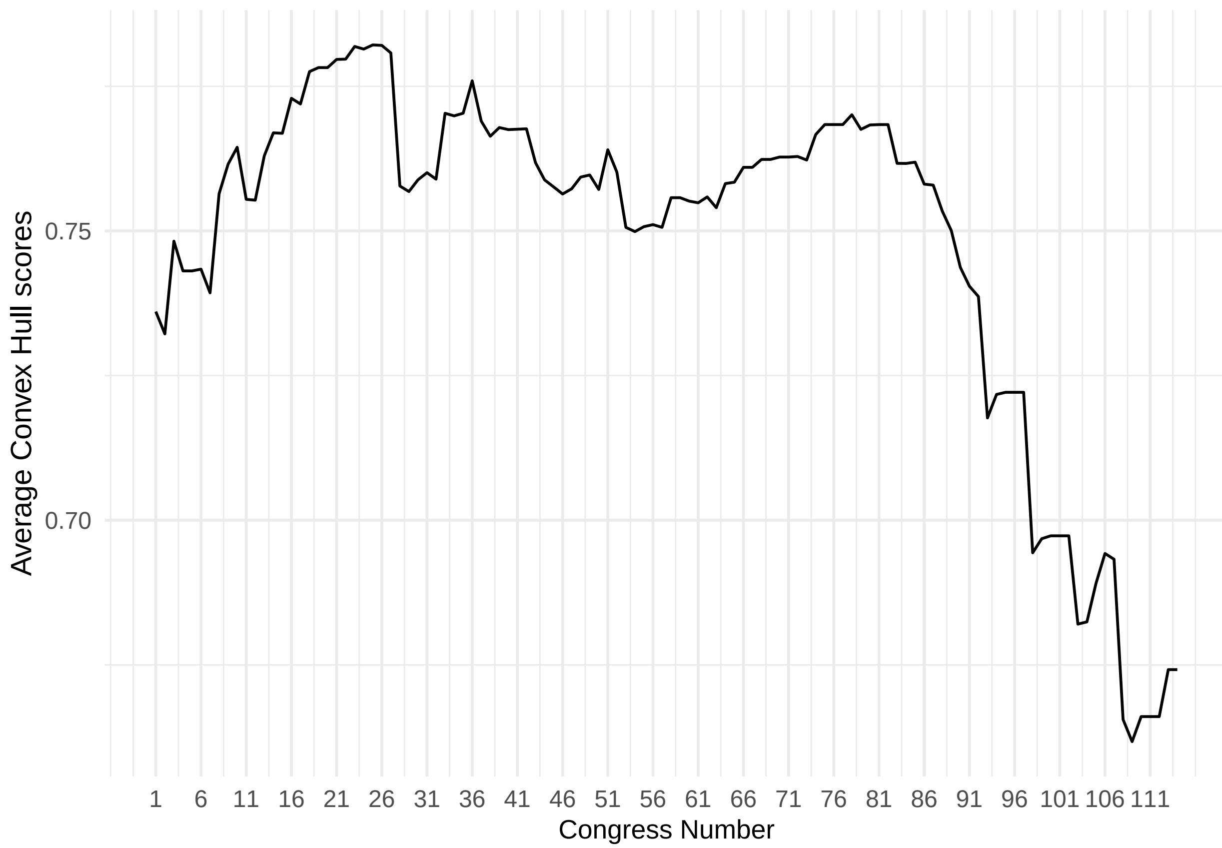

Figure A6: Average District Convex-HullCompactness by Congress, 1789-2012

Thornburg v Gingles and the 1982 VRA amendments may have further reduced average compactness by encouraging the creation of majority-minority districts. The data show a small recent increase in Reock and Convex Hull compactness over the last few congresses (though not Polsby-Popper). These patterns are distinct from the fine-grained differences across redistricting eras identified by MAPS scores.

A5.2 Correlations between MAPS and Compactness Change.

The MAPS scores are moderately correlated with changes in compactness between pairs of successive congresses. Table A3 shows the correlations between MAPS measures and changes in Polsby-Popper, Reock, and Convex-Hull compactness by district for each pair of successive congresses from the 1st to 114th Congresses.

Table A3: Correlations between MAPS measures and compactness, 1789-2012

	Margins	Alignment	Position	Size	Polsby-Popper	Reock
Margins	1					
Alignment	0.547	1				
Position	0.364	0.229	1			
Size	0.371	0.239	0.262	1		
Polsby-Popper	0.199	0.113	0.065	0.081	1	
Reock	0.204	0.12	0.065	0.075	0.582	1
Convex Hull	0.193	0.117	0.059	0.067	0.663	0.689

Compactness and the Margin measure are moderately correlated, but the correlations are otherwise modest – unsurprising given that these are distinct measures of change which vary independently. The relatively limited correlations between these measures confirm the value of the granular MAPS approach: measuring and analyzing each form of district change separately.

A6 Race and Party Model Coefficients

Table A4: Interactions between Race, Party, Decade, and MAPS Change

	Race	Party
Black population in state	−0.162***	
	(0.027)	
1800s	−0.160**	
	(0.052)	
1810s	−0.265***	
	(0.050)	
1820s	−0.315***	
	(0.047)	
1830s	−0.355***	
	(0.046)	
1840s	−0.243***	
	(0.045)	
1850s	−0.281***	
	(0.045)	
1860s	−0.313***	
	(0.046)	
1870s	−0.234***	0.154*
	(0.044)	(0.060)
1880s	−0.271***	0.106+
	(0.044)	(0.059)
1890s	−0.347***	0.105+
	(0.043)	(0.059)
1900s	−0.364***	0.066
	(0.043)	(0.059)
1910s	−0.356***	0.054
	(0.043)	(0.058)

Table A4: Interactions between Race, Party, Decade, and MAPS Change *(continued)*

	Race	Party
1920s	−0.470***	−0.085
	(0.043)	(0.059)
1930s	−0.251***	0.098+
	(0.043)	(0.057)
1940s	−0.391***	0.021
	(0.043)	(0.058)
1950s	−0.383***	0.039
	(0.043)	(0.058)
1960s	−0.064	0.374***
	(0.043)	(0.057)
1970s	−0.172***	0.224***
	(0.043)	(0.057)
1980s	−0.084*	0.307***
	(0.043)	(0.057)
1990s	−0.014	0.451***
	(0.043)	(0.058)
2000s	−0.213***	0.178**
	(0.043)	(0.058)
2010s	0.091*	0.519***
	(0.042)	(0.057)
Interaction with decade (1800s)	0.066+	
	(0.035)	
Interaction with decade (1810s)	0.075*	
	(0.033)	
Interaction with decade (1820s)	0.120***	
	(0.031)	
Interaction with decade (1830s)	0.164***	
	(0.031)	

Table A4: Interactions between Race, Party, Decade, and MAPS Change *(continued)*

	Race	Party
Interaction with decade (1840s)	0.197***	
	(0.031)	
Interaction with decade (1850s)	0.171***	
	(0.031)	
Interaction with decade (1860s)	0.154***	
	(0.035)	
Interaction with decade (1870s)	0.181***	0.098
	(0.030)	(0.073)
Interaction with decade (1880s)	0.133***	0.109
	(0.030)	(0.071)
Interaction with decade (1890s)	0.135***	−0.041
	(0.030)	(0.071)
Interaction with decade (1900s)	0.158***	0.017
	(0.030)	(0.070)
Interaction with decade (1910s)	0.110***	0.048
	(0.030)	(0.069)
Interaction with decade (1920s)	0.137***	0.096
	(0.030)	(0.069)
Interaction with decade (1930s)	0.140***	0.243***
	(0.031)	(0.070)
Interaction with decade (1940s)	0.085**	0.065
	(0.032)	(0.069)
Interaction with decade (1950s)	0.134***	0.028
	(0.034)	(0.069)
Interaction with decade (1960s)	0.141***	−0.026
	(0.036)	(0.069)
Interaction with decade (1970s)	0.085*	0.098
	(0.038)	(0.069)

Table A4: Interactions between Race, Party, Decade, and MAPS Change *(continued)*

	Race	Party
Interaction with decade (1980s)	0.099**	0.099
	(0.038)	(0.069)
Interaction with decade (1990s)	0.256***	−0.079
	(0.038)	(0.069)
Interaction with decade (2000s)	0.172***	0.084
	(0.038)	(0.069)
Interaction with decade (2010s)	0.173***	0.018
	(0.036)	(0.068)
Republican-held seat		−0.047
		(0.062)
Num.Obs.	36 645	31 444
R2	0.049	0.055
R2 Adj.	0.048	0.054
Log.Lik.	−38 312.817	−32 878.130
F	42.351	59.258
+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001		

Appendix References

Altman, Micah. 1998. "Modeling the Effect of Mandatory District Compactness on Partisan Gerrymanders." *Political Geography* 17 (8): 989–1012. https://doi.org/10.1016/S0962-6298(98)00015-8.

Fryer, Roland G., and Richard Holden. 2011. "Measuring the Compactness of Political Districting Plans." *The Journal of Law and Economics* 54 (3): 493–535. https://doi.org/10.1086/661511.

Horn, David L., Charles R. Hampton, and Anthony J. Vandenberg. 1993. "Practical Application of District Compactness." *Political Geography* 12 (2): 103–20. https://doi.org/10.1016/0962-6298(93)90031-2.

Kaufman, Aaron R., Gary King, and Mayya Komisarchik. 2021. "How to Measure Legislative District Compactness If You Only Know It When You See It." *American Journal of Political Science* 65 (3): 533–50. https://doi.org/10.1111/ajps.12603.

Polsby, Daniel D., and Robert D. Popper. 1991. "The Third Criterion: Compactness as a Procedural Safeguard Against Partisan Gerrymandering." *Yale Law & Policy Review* 9 (2): 301–53. https://www.jstor.org/stable/40239359.