SHORT ARTICLE

Institutional Control of Redistricting and the Geography of Representation

Barry Edwards, University of Central Florida
Michael Crespin, University of Oklahoma
Ryan D. Williamson, University of Georgia
Maxwell Palmer, Boston University

A number of states have empowered independent redistricting commissions (IRCs) to redraw legislative districts each decade following the US Census. Reformers see IRCs, which have binding authority and political independence, as a solution to the practice of gerrymandering and have proposed using them throughout the United States. With less incentive to protect incumbents, do IRCs adhere more closely to traditional redistricting principles, such as drawing compact districts, maintaining continuity, and respecting political subdivisions? We examine a large sample of congressional and state legislative districts and find that, relative to legislatures, IRCs tend to draw more compact districts, split fewer political subdivisions, and may also do a better job of preserving the population cores of prior districts.

We evaluate the adherence of redistricting institutions to traditional redistricting principles with a large sample of districts drawn for state and federal elections. We find that independent redistricting commissions (IRCs) draw significantly more compact districts, show more respect for the boundaries of local governments, and may do a better job of preserving the population cores of prior districts compared to maps drawn by state legislatures.

Our research speaks to the growing movement to reform the redistricting process. Some states have already delegated redistricting authority to special commissions, and many more are considering shifting some or all responsibility for redistricting to commissions. In the past few years, reformers have introduced bills or ballot initiatives to create or strengthen redistricting commissions in 33 states that collectively send 370 representatives to Congress.[1] This reform movement potentially affects the political representation of hundreds of millions of Americans at both the state and federal levels, but it is not clear what effect commissions have. Our research offers tempered evidence consistent with the objectives of redistricting reformers.

POLITICAL REPRESENTATION AND TRADITIONAL REDISTRICTING PRINCIPLES

The institution responsible for redistricting is likely to draw district boundaries in line with its interests. When state legislators draw district lines, electoral motivations—rather than constituents' interests—may guide their hands. Indeed, the term *gerrymander* derives from the bizarre, salamander-shaped district hatched to keep Elbridge Gerry's party in power in Massachusetts. When state legislators control the redistricting process, they may compromise traditional re-

Barry Edwards (Barry.Edwards@ucf.edu) is a lecturer at the University of Central Florida, Orlando, FL 32816. Michael Crespin (crespin@ou.edu) is the associate director of the Carl Albert Center and associate professor of political science at the University of Oklahoma, Norman, OK 73019. Ryan D. Williamson (ryandw10@uga.edu) is a PhD candidate at the University of Georgia, Athens, GA 30602. Maxwell Palmer (mbpalmer@bu.edu) is an assistant professor at Boston University, Boston, MA 02215.

Data and supporting materials necessary to reproduce the numerical results in the paper are available in the *JOP* Dataverse (https://dataverse.harvard.edu/dataverse/jop). An online appendix with supplementary material is available at http://dx.doi.org/10.1086/690633.

1. Redistricting commissions have recently been proposed by legislators in 30 states (AL, CT, DE, FL, GA, IL, IN, KS, KY, LA, MA, MD, MI, MN, MO, NC, NE, NH, NM, NY, OH, OR, PA, SC, TN, UT, VA, WV, and WI). Voters in three states have advanced ballot initiatives (CO, IL, SD). California legislation would expand the authority of its Citizens Redistricting Commission. The types of commissions proposed vary in terms of authority and selection procedures.

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districting principles to advance their own electoral interests. In general, redistricting commissions have less incentive to manipulate district boundaries for partisan gain. IRCs do not need to protect incumbents because they have both binding authority and political independence. Advisory commissions, back-up commissions, and nonindependent commissions may need to take legislators' interests into account to pass their plans, though perhaps to a lesser degree than the legislature.

The composition of IRCs varies from state to state, but the essential element of independence is not allowing public officials to serve as commissioners. In states like Arizona, Montana, and Washington, Democrats and Republicans appoint the same number of commissioners, and their appointees select the final commissioner. In 2010, California relied on independent state auditors to review over 36,000 applications for analytic skills, the ability to be impartial, and an appreciation for the state's diverse demographics and geography (MacDonald 2012). The process ultimately pared the field to 14 commissioners, all with advanced degrees, who attended open meetings throughout the state to receive public input. Why would people without a direct stake in redistricting do this work? Commissioner biographies indicate strong interest in public service and collaborative problem solving.[2] Like juries, IRCs are meant to apply redistricting standards, including traditional principles found in state statutes and constitutions, in an impartial manner after considering the relevant evidence.

Scholars have identified a number of benefits of traditional redistricting principles, including limiting unlawful gerrymandering (Forgette and Platt 2005; Winburn 2008), lowering the costs of campaigns and elections (Bullock 2010), and facilitating responsive representation (Bowen 2014; Niemi, Powell, and Bicknell 1986; Winburn and Wagner 2010).[3] We do not maintain that traditional redistricting principles are more important than drawing equally populated districts or providing equal opportunities to minority voters. To some extent, political equality requires sacrificing the cores of prior districts, compactness, and dividing local subdivisions. However, once higher priority objectives are satisfied, many believe the mapmakers should adhere to traditional principles. These principles are widely recognized in state constitutions, and their relatively noncontroversial status makes them attractive criteria for comparing the work of different redistricting institutions (Butler and Cain 1992).

The differences between redistricting institutions discussed above lead us to propose a number of specific hypotheses. First, we expect IRCs to draw more compact districts than state legislatures do. Second, IRC-drawn districts will divide fewer counties and cities than legislature-drawn districts. However, our expectations with respect to continuity are more complicated. We expect redistricting commissions to see more value in preserving population cores of prior districts than election-minded legislators, but legislators may also protect the cores of prior districts to protect incumbents. Because both of these expectations seem reasonable, we do not hypothesize a direction with respect to district continuity.

DATA AND METHODS

Our sample of congressional districts includes those created for the 1972, 1982, 1992, 2002, and 2012 elections; our state sample consists of all 6,723 districts drawn for 2012 elections. To our knowledge, this is the most comprehensive comparison of redistricting institutions to date. We specify whether the congressional and state legislative districts in our sample were drawn by a state legislature, a redistricting commission, or a court. We utilize the typology of redistricting commissions found in Edwards et al. (2016) to further distinguish independent redistricting commissions (IRCs) from other commissions that lack either binding authority or political independence. We identify court-drawn districts because prior research suggests that courts draw districts differently than state legislatures do (Carson and Crespin 2004; Carson, Crespin, and Williamson 2014). In each model, plans drawn by state legislatives are the baseline category.

Compactness may seem like a simple principle, but measuring compactness is rather complicated. According to Bullock (2010), since *Shaw v. Reno* (509 U.S. 630 [1993]), courts have focused on three quantitative measures, which are illustrated in figure 1. Reock scores and Convex Hull ratios, two dispersion measures, are calculated by dividing the area of the district by the area of the smallest circle that would fully contain the district (Reock 1961) or the smallest convex polygon enclosing the district. Polsy-Popper scores are derived by dividing the area of a district by the area of a circle with a perimeter equal in length to the perimeter of the district (Polsby and Popper 1991). Each of these measures is bounded between 0 and 1, with higher values corresponding to more compact districts. We calculate these three measures using ArcGIS and shape files for congressional and state districts, a method detailed in Ansolabehere and Palmer

2. See biographies of California Citizens Redistricting Commission (http://wedrawthelines.ca.gov/bios.html) and Arizona Independent Redistricting Commission (http://azredistricting.org/About-IRC/Commissioners.asp). The access date for both websites is February 2, 2017.

3. Continuity serves different objectives. Preserving the population cores of old districts is a way to honor the results of prior elections and to preserve the relationships cultivated between representatives and their constituents (Clarke and Evans 1983).

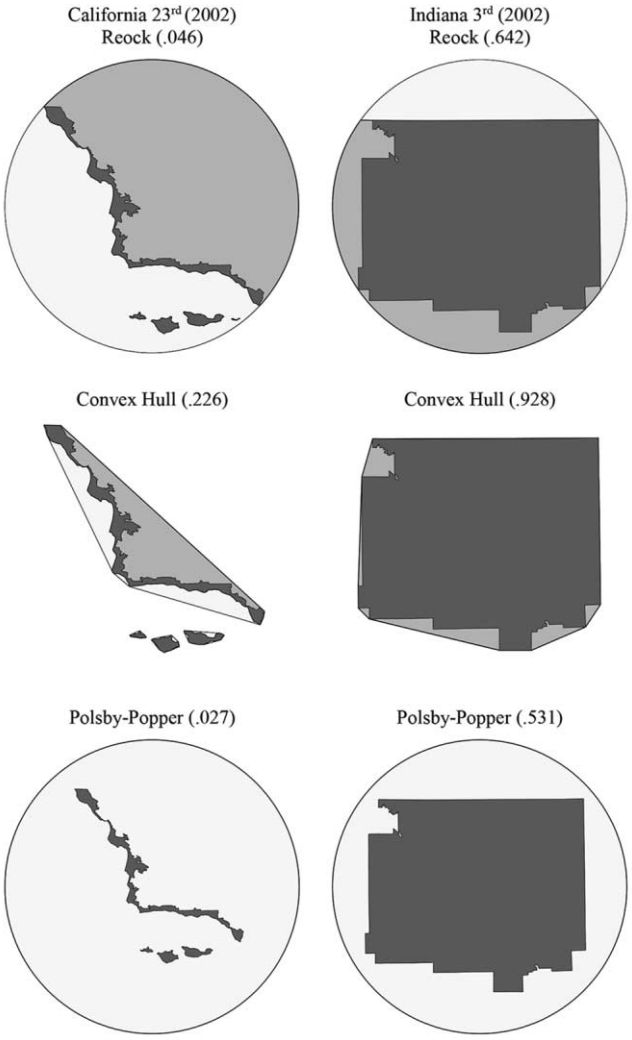

Figure 1. Examples of compactness measures

(2016).[4] Because no single measure is considered the sole or best metric, we use multiple measures to ensure our results are robust and not simply a function of the measure employed.[5]

To measure respect for political subdivisions, we follow the standard practice of counting cities and counties split by district boundaries (Butler and Cain 1992; Miller and Grofman 2013). We measure district continuity as the largest remaining core of a prior district. In the absence of a standard continuity measure (Butler and Cain 1992; Crespin 2005; Niemi et al. 1986), we think this approach best operationalizes preserving the cores of prior districts.[6] We use the Missouri Census Data Center's Geographic Correspondence Engine to generate our measures of respect for political subdivisions and continuity, but its coverage is limited to 1992, 2002, and 2012, reducing the number of observations in some of our analysis of congressional districts.[7] We report descriptive statistics for our dependent variables in appendix table 1 (the appendix is available online).

We include two control variables in all of our regression models: we identify districts that were subject to Section 5 of the Voting Rights Act (VRA) and control for the number of districts being drawn.[8] We also include other control variables in particular analyses. We control for the number of counties and cities in each state in our analyses of county and city splits. The city splits model also takes into account the proportion of the population in unincorporated areas of counties (which allows district boundaries to avoid cities). In our analysis of congressional districts, we control for differences between cycles with fixed effects and control for the absolute number of seats a state gained or lost in reapportionment.[9] Single congressional district states are not included in any of our analyses. Finally, in our analysis of state districts, we control for differences between upper and lower chambers.

RESULTS

To test our hypotheses, we perform a series of regressions. When the dependent variable is a proportion, we estimate a generalized linear model with a logit link and the binomial family. We use ordinary least squares to analyze the number of cities and counties split by districts.[10] Our results indicate that redistricting institutions significantly affect the geography of representation in the United States. IRCs draw significantly more compact congressional districts than do state legislatures on all three measures considered and more com-

4. Shape files for congressional districts were assembled by Lewis et al. (2013). Shape files for state legislative districts are from the US Census Bureau.

5. Adjusted compactness measures can account for constraints imposed on mapmakers such as state boundaries and bodies of water. We present our analysis of adjusted measures, along with a popular perimeter measure developed by Schwartzberg (1965), in the appendix.

6. In a supplemental analysis on continuity, included in the appendix, we count the number of old districts used, in whole or in part, to create the new district.

7. See http://mcdc.missouri.edu/websas/geocorr12.html (accessed February 1, 2017).

8. Districts subject to Section 5 of the VRA include those in states fully covered as well as districts that affected minority voters' rights in covered cities and counties. For example, Kings County in New York was subject to Section 5, although the State of New York was not, so we code all congressional and state legislative districts that overlapped Kings County as Section 5 districts.

9. We consider whether IRCs have drawn districts differently over time by estimating separate models for each election cycle. See appendix tables 8a–8f. The results are reasonably robust.

10. We also use negative binomial regression to analyze the number of cities and counties split, and we present these results in the appendix. The marginal effects of the independent variables in this count model approach are virtually identical to the ordinary least squares coefficient estimates.

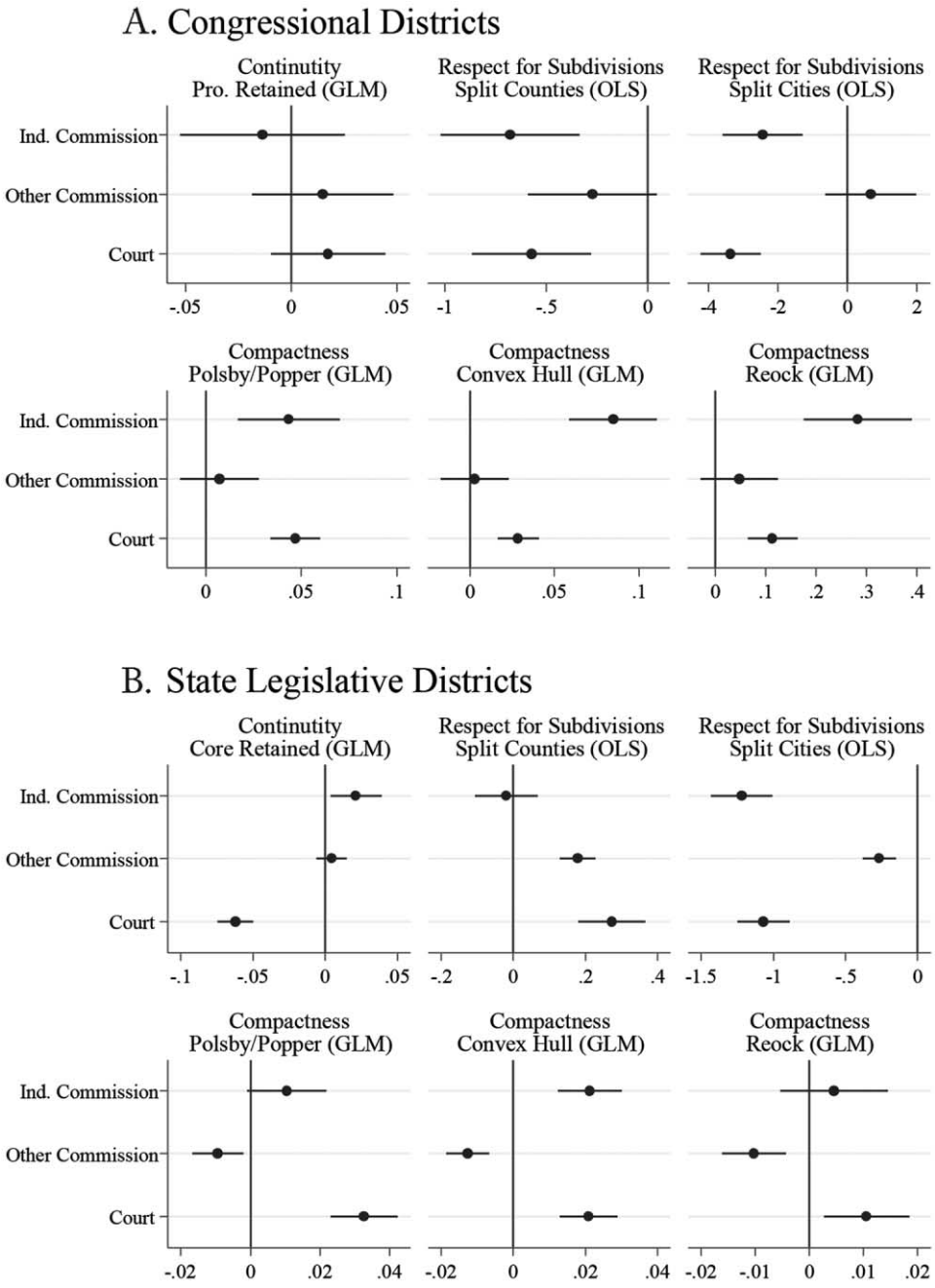

Figure 2. Effect of redistricting type for congressional and legislative districts

pact state legislative districts on two out of three metrics.[11] The congressional districts drawn by other types of redistricting commissions are not significantly different from those drawn by state legislatures, but the districts they create for state contests are significantly less compact. In order to better display the substantive significance of our results, we plot the average effect of redistricting institutions on compactness in figure 2. (See appendix table 2 for full numerical results.)

We find that IRC-drawn congressional districts split 0.68 fewer counties and 2.44 fewer cities than those produced by state legislatures. State legislative districts drawn by IRCs and state legislatures are indistinguishable in terms of counties split, but IRC-drawn districts divide 1.22 fewer cities. The amount of respect shown to political subdivisions varies considerably. We do not find significant differences among redistricting institutions with respect to preserving the cores of prior congressional districts. At the state level, however,

11. The state-level Polsby-Popper coefficient is statistically significant using the appropriate directional one-tailed test.

we find that IRCs do a better job of preserving the cores of prior districts than state legislatures do.

To test the robustness of our findings, we consider whether states that now use IRCs had more compact districts in 1972 and 1982, before using IRCs.[12] If these states' districts were more compact before they used IRCs, it is unlikely that IRCs increased compactness. The coefficient on the IRC variable fails to achieve statistical significance in any of these models; in fact, these states' districts were significantly less compact based on the Polsby-Popper measure (see appendix table 4).

DISCUSSION AND CONCLUSION

Although we have analyzed a large sample of districts, redistricting by institutions other than states legislatures is a relatively new phenomenon. We identify some significant differences between districts produced by IRCs and state legislatures, but redistricting reform is still in a formative stage. Because IRCs are reform measures, they may disregard the cores of gerrymandered districts in the short term, but continuity might increase in the long term as IRCs revisit maps they created (as opposed to maps they inherited from state legislatures). Redistricting after the 2020 Census should provide researchers the opportunity to observe more of the work of varied redistricting institutions and to revisit the findings reported here.

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12. We also estimate our models of adherence to traditional redistricting principles with fixed effects for states, and we report these results in appendix table 3. Although this approach yields different partial regression coefficients, these results are reasonably consistent with our main results.