# *The Effect of State Redistricting Methods on Electoral Competition in United States House of Representatives Races*

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**ABSTRACT**

Legislative redistricting in the states is highly contentious due, at least in part, to its partisan implications. But does the method by which states draw legislative districts affect partisan competition in the elections that are held in these districts? We examine the effects of three methods used by states to draw district boundaries on competition in congressional elections. Specifically, we evaluate the effects on competition of legislative, judicial, and commission redistricting plans enacted prior to the 1992 and 2002 congressional elections. We find that more competitive elections occur when courts and commissions are directly involved in the redistricting process, as opposed to when redistricting is handled only in the state legislative process.

The United States Constitution requires that a census be taken every 10 years to reapportion representation in the United States House of Representatives, but the Constitution implicitly leaves the drawing of political districts following each census to the states. While the federal courts have defined strict guidelines for drawing these districts, there have been few constraints imposed on the states as to who should actually draw and approve these boundaries. As a result, the states have set the responsibility for this inherently political task to different officials (McDonald 2004). In some states, such as California, Georgia, and Michigan, state legislatures drew their congressional district boundaries in the 2002 redistricting cycle, resulting in partisan gerrymandering. In other states, such as Iowa and Maryland, commissions drew the new political districts, with the expectation that these politically more disinterested commissions would draw more competitive districts. In a third set of states, such as Colorado and Pennsylvania, legislatures were unable to agree on a congressional redistricting plan in 2002, leading to judicial intervention in the process.[1]

Does the method by which districts are drawn affect the competition

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of the races subsequently held in them? With the variety of redistricting methods used in the states, they provide an ideal setting to address this important institutional question. Electoral competition is the lifeblood of a strong democracy (Rossiter 1961), but while scholars have tried to assess the effect of state redistricting policy on political competition (Born 1985; Cain 1985; Niemi and Winsky 1992; Niemi and Abramowitz 1994), we still know little about these effects.

We examine the effects of various districting methods on the degree of competition in United States House races after the 1992 and 2002 redistricting cycles. Previous analyses have focused almost exclusively on the partisan effects of redistricting by legislatures (e.g., Abramowitz 1983 and Niemi and Winsky 1992), but the increased use of redistricting commissions in recent redistricting cycles warrants further attention.[2] Furthermore, the extant literature has largely ignored the electoral implications of court-drawn districting plans. In fact, commissions and courts were responsible for drawing congressional districts in 16 states in 1992 and 17 states in 2002. Since courts and commissions have fundamentally different incentives and goals in redistricting than partisan politicians in state legislatures, it is likely that the political results of districts they draw will also be different. We find that when courts or commissions draw districts, subsequent elections in them are more competitive than when districts are drawn by legislatures.

## ELECTORAL CONSEQUENCES OF REDISTRICTING

Scholars of partisan competition and congressional redistricting have examined the latter's link to both the decline in the number of competitive seats in Congress and its effect on the partisan balance of seats there. Mayhew (1971) and Tufte (1973) were among the first to suggest that redistricting could help explain the increase in the incumbency advantage in Congress. Noting the decline in competition in the first election following a redistricting cycle, Tufte (1973) argued that incumbents might influence the redistricting process to save their seats.[3] Other scholars have focused on the effect of redistricting on the aggregate partisan balance of seats in the United States House. For example, Abramowitz (1983) documented gains by Democratic candidates in the 1982 elections in states where Democrats controlled the redistricting process. Niemi and Winsky (1992) replicated this research design for the 1970s and found the same effect (see also Born 1985). In contrast, Niemi and Abramowitz (1994) found that party control of the redistricting process in the 1990s yielded little partisan advantage in the 1992 elections.

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Cain (1985) moved the discussion forward by considering the differences among various redistricting methods. He identified two types of legislatively drawn redistricting plans: partisan and bipartisan. Partisan redistricting, or gerrymandering, is the attempt to deprive the minority party of as many seats as possible. Bipartisan redistricting plans passed through the legislative process generally occur under divided government, and they usually are drawn to make incumbents of both parties as safe as possible (Lyons 2003).

Butler and Cain (1992) and Hirsch (2003) consider alternatives to legislative redistricting plans, including those drawn by commissions and courts. They argue that commissions and courts focus largely on factors other than partisan politics when redrawing district boundaries, factors such as compactness, partisan fairness, responsiveness, and accountability. Although increased aggregate and district-level competitiveness may not be a manifest goal of commissions, it may turn out to be a byproduct of their efforts. While Butler and Cain (1992) contend that it is more difficult to generalize about the goals of court-drawn plans, they suggest that if courts pursue any one goal, it is protecting the status quo (i.e., incumbency protection). However, they do not test this hypothesis empirically.

## DOES REDISTRICTING AFFECT ELECTORAL COMPETITIVENESS?

Partisan advantage aside, can redistricting affect electoral competitiveness? To answer this, we must understand the goals of the players involved in the various redistricting methods: state legislators and governors, commissioners, and judges. For each redistricting method, we assume these players are rational actors who try to achieve their respective goals. However, different institutional constraints are inherent in the three methods, and these constraints affect these players' abilities to achieve their goals.[4] When the legislature draws the districts, for instance, it is acting as a continuously functioning legislative body consisting of elected members with their own personal re-election goals and with direct ties to the political parties whose goals may conflict with legislators' personal goals (Schaffner, Wagner, and Winburn 2004). For example, the National Republican Congressional Committee hired a director of redistricting prior to the 1992 redistricting cycle for the purpose of coordinating districting efforts in the states (Benenson 1990). The interaction of these goals and institutional constraints vary among the redistricting types, and, therefore, we expect the outcomes of the processes to differ.

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### *Partisan and Bipartisan Redistricting Plans in the Legislature*

Legislatively drawn redistricting plans can be either partisan or bipartisan (Cain 1985). Typically, partisan plans are drawn when one party controls both chambers of the legislature and the governor's office.[5] Bipartisan plans can be the consequence of divided government, which gives each party at least one veto point in the process (Krehbiel 1998).

Actors drawing partisan plans can be thought of as having two goals: to re-elect all of their party's incumbents and to pick up additional seats from the minority party.[6] There are at least two ways the majority party attempts to accomplish these goals (Butler and Cain 1992). First, it can pack voters from the minority party into overwhelmingly safe districts for that party, thus wasting their votes. The majority party may even place two minority party incumbents in the same district to assure the defeat of one of them. Second, the majority party may dilute the minority party's strength by spreading the latter's supporters among several districts, thereby splintering its support. Splintering may increase partisan competitiveness in certain districts while increasing the likelihood that the majority party wins more House seats and thus decreasing aggregate competition, but packing may decrease competitiveness in other districts, leading to no net change in competitiveness. Thus, we expect to find no change in the overall degree of electoral competitiveness with partisan redistricting plans. This dual nature of partisan redistricting plans makes it difficult to sort out the underlying changes in overall competitiveness, which leads to our expectation of null results. But as with bipartisan mapmakers seeking incumbent protection, partisan legislative redistricters are risk-averse and want to reduce or maintain the current levels of competition.

Bipartisan plans require more consensus to enact than partisan plans since both parties need to be satisfied. But since all legislators can be assumed to have the same personal goal of re-election (Mayhew 1974), a plan that protects incumbents may be agreed upon easily by both sides. Such incumbency protection redistricting plans will involve only small changes in districts to keep constituencies consistent and make representatives safer, within the constraints of legal requirements and demographic shifts. Thus, we expect to see no change in competition under bipartisan plans. In both partisan and bipartisan redistricting, the individual actors are primarily concerned with maintaining the status quo, and so we expect little or no change in the competitiveness of seats drawn by legislatures. For this reason, we will combine these two types of plans in our analysis below.

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### *Commission- and Court-Drawn Redistricting Plans*

Redistricting commissions and courts are not subject to the same electoral and institutional constraints in the redistricting process as state legislators.[7] In some cases, commissioners are not elected officials; in some states, they are not even allowed to hold elected office for a number of years after the redistricting cycle. Thus, the acute personal ambition motivation so important in the legislative process is absent. In other states, commissions are made up of state legislators and gubernatorial representatives.[8] For example, in Indiana and Minnesota, commissioners are selected from the legislature, while other states, like Hawaii and Idaho, do not allow elected representatives to exercise any influence in the redistricting process. But since all commissions are, at least to some degree, not directly controlled by the state legislature, the districts they draw should differ from those drawn through the legislative process.

In addition to variation in their membership selection procedures, redistricting commissions are also subject to a variety of institutional constraints, such as when they are formed, tie-breaking rules, overriding objectives, and deadlines for submitting completed plans (Butler and Cain 1992). For example, in Hawaii, the districts are not allowed to "unduly favor a person or political faction."[9] In Iowa, the nonpartisan Legislative Services Bureau is not allowed to use party registration data or consider the homes of incumbents when redrawing district boundaries (Butler and Cain 1992). California's commission is required to stress compactness and community interests, while in Florida, the commission is required to ignore the hometowns of the incumbent members of Congress (Blumenauer and Leach 2003).

Without the ability or inclination to use partisan criteria to draw districts, it is unlikely that commission redistricting will increase incumbency protection. Moreover, the overriding goals of the commissions and their relative independence from the legislature should produce more "fair," that is, more competitive, districts at the state legislative and congressional level (Blumenauer and Leach 2003; Kubin 1996–97). Therefore, we expect partisan competition to increase, relative to legislatively drawn plans, when commissions draw district boundaries.

Similarly, the courts do not have the same selection processes and redistricting constraints and goals as state legislatures. The judicial selection process may affect the degree of partisanship in redistricting when the courts are asked to resolve disputes. Judges may gain the bench through partisan elections, nonpartisan elections, appointment, or hybrid merit plans (Hall 2001). In 10 of the 14 states with judicial redistricting plans in 1992 or 2002,

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a panel of appointed federal judges approved plans; in the others, state courts did so. And since even many of the state judges do not have an electoral connection to the redistricting process, judges likely feel less pressured to protect incumbents and thus, are free to make larger changes in districts. Judges may also feel compelled to follow fairness guidelines similar to commissions, given their professional training and norms. For these reasons, we expect that court-drawn redistricting plans will be more competitive than legislatively drawn plans.

## DATA AND METHODS

We test our hypotheses with data from the post-redistricting congressional elections of 1992 and 2002. We employ a dichotomous dependent variable for district electoral competitiveness, coded 1 when the winning candidate received less than 60 percent of the two-party vote in the election subsequent to redistricting, and 0 otherwise. This measure of competition is commonly used in the literature on congressional elections (Jacobson 2004) and redistricting (Mayhew 1974; Ferejohn 1977; Cox and Katz 2002).[10]

Table 1 gives the percentages of competitive races for each type of districting method in our dataset. For both the 1992 and 2002 elections, districts drawn by courts and commissions tended to be more competitive than those drawn by the legislative process. For instance, 43.7 percent of the seats drawn by commissions in 1992 resulted in competitive elections that year, as compared to only 33.5 percent of the seats drawn by legislatures. While this provides some initial support for our hypotheses, there are many other factors that can affect the degree of competition in congressional elections. To control for these factors, we test our hypotheses using multivariate probit models, pooling our data across the 1992 and 2002 elections.

*Table 1.* Proportion of Competitive United States House Seats by Type of Districting Method, 1992 and 2002

| Type of Redistricting Method | Competitive Seats in 1992 | | Competitive Seats in 2002 | |
|---|---|---|---|---|
| | Percent | Total Districts | Percent | Total Districts |
| Legislative | 33.5% | 194 | 16.3% | 295 |
| Court | 36.5 | 115 | 23.3 | 60 |
| Commission | 43.7 | 119 | 31.0 | 71 |

*Note:* A race is deemed competitive if the winning candidate received less than 60 percent of the two-party vote in the general election. The total number of districts is less than 435 due to single-district states being excluded from the dataset and Maine's lack of a redistricting plan for the 2002 elections.

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In our multivariate model, we test our hypotheses of the effect of the redistricting method on district-level competition by creating two dichotomous variables for the method of redistricting. The variable, *commission* is coded 1 if a commission drew the plan, and 0 otherwise. The variable, *court*, is coded in parallel fashion, leaving legislatively drawn plans as the reference category.

Other factors known to influence electoral competition in a district are included in our model as covariates. First, a *quality challenger* can increase the competition in House races (Jacobson 2004), so we control for it in our model.[11] We use previous successful electoral experience as a proxy for candidate quality (Jacobson 1980). We also include a variable measuring whether an incumbent was not seeking re-election (*open seat*) since these races tend to be more competitive than those contested by an incumbent (Gaddie and Bullock 2000). Since *candidate spending* affects competitiveness (Jacobson 1980), we also control for it, operationalizing this variable as the natural log of the total amount of money spent by both the Republican and Democratic candidates in a race.[12]

Competition is also affected by the partisan composition of a district (Jacobson 2004). To control for this, we subtract the Republican two-party presidential candidate's national vote margin from his margin in the district for the 1992 and 2000 presidential elections (adjusted for redistricting).[13] As a district becomes more partisan, we expect the election in that district to become less competitive. We also include a *south* dummy variable to control for any regional differences in the level of competition that stem from the need for pre-clearance under the Voting Rights Act of 1965 (Hill 1995). Finally, we include a dummy variable for the 2002 election to control for any year-to-year differences that might otherwise bias the results.

## RESULTS

Table 2 presents the estimates from the initial probit analysis of our model of influences on electoral competition in House races. First, we see that when courts draw district boundaries, there tend to be more competitive races than when the legislature draws them. The same results hold for commission-drawn plans, as predicted. While the marginal effects on the increase in competitiveness are not overwhelming (0.049 and 0.041, respectively), many House races are decided by a small margin, especially after redistricting (Cox and Katz 2002; Jacobson 2004). Furthermore, even if just a few races would have gone Democratic instead of Republican in the 2002 election, the majority status in the House would have changed. Finally, the marginal

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*Table 2.* Probit Estimates for the Impact of Redistricting Method on Competition in United States House Elections, 1992 and 2002

| Variable | Coefficient (Standard Error) | p-value[a] | df/dx[b] |
|---|---|---|---|
| Court | .367 | .008 | 0.049 |
| | (.151) | | |
| Commission | .317 | .013 | 0.041 |
| | (.141) | | |
| Quality challenger | .382 | .004 | 0.049 |
| | (.142) | | |
| District partisanship | –.011 | .038 | –0.001 |
| | (.006) | | |
| Candidate spending | 1.284 | .000 | 0.143 |
| | (.105) | | |
| Open seat | .263 | .057 | 0.034 |
| | (.166) | | |
| South | .044 | .375 | 0.005 |
| | (.139) | | |
| 2002 | –1.112 | .000 | –0.133 |
| | (.145) | | |
| Constant | –17.814 | .000 | — |
| | (1.424) | | |
| N | 854 | | |
| Log-Likelihood | –314.4 | | |
| PRE | .47 | | |
| $\chi^2$ | 391.21 | 0.000 | |
| % correctly predicted | 84.89 | | |

[a]One-tailed

[b]Calculated using the dprobit command in Stata 8. This measures the change in the probability for an infinitesimal change in each independent, continuous variable and the discrete change in the probability for dichotomous variables.

*Note:* Estimating the probability of a competitive congressional election, where a race is deemed competitive if the winning candidate received less than 60 percent of the two-party vote in the election subsequent to redistricting.

effects of these non-legislative plans are not statistically different from the effect of the quality of the challenger, a factor known to alter congressional election outcomes. Thus, this result suggests that these redistricting method variables are both statistically and substantively significant and may even help to explain the number of incumbent defeats that are often observed in election years subsequent to a redistricting cycle (Jacobson 2004). Assuming that one of the goals of court- and commission-drawn plans is to produce more competitive elections, then our findings suggest that this objective is being met. However, to achieve the goal of preserving the status quo, it would be best to give direct control over the redistricting process to the state legislature to better promote incumbency protection.[14]

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Considering the additional covariates in the model, we see that the presence of a quality challenger and more campaign spending both increase the competition in a House election. As others have suggested (Basinger and Ensley 2003; Jacobson 2004), spending appears to exert the largest effect on competition of any of the variables included in the model. Also, as a district becomes more partisan, it becomes less competitive. In contrast, factors such as whether the race was held in the south or was for an open seat do not exert a statistically significant impact on electoral competition. Finally, the negative coefficient for the 2002 fixed effects variable indicates a decline in competitive House elections from 1992 to 2002.

## CONCLUSION

We have examined the effects of three types of redistricting methods—legislative, commission-drawn, and court-drawn plans—on the degree of electoral competition in congressional races. By considering the opportunities, objectives, and constraints of the different actors involved in these redistricting methods, we hypothesized that they would produce districts with different levels of competition. As hypothesized, we found that court- and commission-drawn plans yielded more competitive districts than legislatively drawn plans. This suggests that by taking self-interest out of this important process, other values, such as competitiveness, may be enhanced.

Our findings have notable implications for democratic accountability. In an era when most elections are viewed as non-competitive (Jacobson 2004; McDonald 2004), our results suggest that partisan competition can be enhanced by removing the redistricting process from the hands of state legislators. While Butler and Cain (1992) and Hirsch (2003) have suggested that it may be possible to increase competition through redistricting, we provide systematic evidence that this is the case.

More questions in this area remain for future work. For instance, we focus exclusively on competition at the congressional level. But the self-interest motivation between state legislators and congressional seats is indirect, at best. A test of the impact of redistricting methods on state legislative district competition would be a more direct test of our hypotheses. Studying changes in competitiveness before and after redistricting would also improve the tests of our hypotheses. In an era of polarized politics, future work will also provide an opportunity to examine more systematically the relationship between redistricting and increased polarization in the United States Congress.

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## APPENDIX A: ASSESSING REDISTRICTING METHODS IN THE STATES

*Table A-1.* States Using Commissions and Courts to Draw Congressional Districts, 1992 and 2002

| Commissions | | Courts | |
|---|---|---|---|
| State | Year | State | Year |
| Arizona | 2002 | Alabama | 1992 |
| California | 1992 | Arizona | 1992 |
| Connecticut | 2002 | Colorado | 2002 |
| Florida | 1992 | Illinois | 1992 |
| Hawaii | 1992, 2002 | Michigan | 1992 |
| Idaho | 2002 | Minnesota | 1992 |
| Indiana | 1992, 2002 | Mississippi | 2002 |
| Iowa | 1992, 2002 | New Mexico | 2002 |
| Maryland | 2002 | New York | 1992 |
| Minnesota | 2002 | Pennsylvania | 1992 |
| New Jersey | 1992, 2002 | South Carolina | 1992, 2002 |
| Oregon | 1992 | Texas | 2002 |
| Rhode Island | 2002 | Wisconsin | 2002 |
| Washington | 1992, 2002 | | |

*Note:* This represents our interpretation of the description of redistricting plans as described in *Congressional Quarterly* 1993 and 2003. At times, it was difficult to discern in these narratives who was actually responsible for drawing the districts. For instance, judges often will appoint commissioners to create redistricting plans for the court to approve. Thus, while a court may be statutorily or constitutionally responsible for redistricting, it may delegate this authority to a commission. For example, in 1992, the California plan was thrown into the courts. But since the court appointed a panel of retired judges to draw the plan, we coded it as a commission. Since both types of nonpartisan plans led to an increase in competitiveness in our data, we do not feel that our coding scheme is driving our results.

## APPENDIX B: CONTROLLING FOR ENDOGENEITY

In modeling electoral competition, the potential for endogeneity in the process poses a number of problems. For example, the choice of prospective candidates to run in a particular race are strategic (Jacobson and Kernell 1981; Cox and Katz 2002; Carson 2003), and so perceptions of potential competition may influence actual challenger quality. Candidate spending may also be affected by the competitiveness of a race, since, if politicians and contributors act strategically, competitive races will attract more campaign contributions, all else being equal (Jacobson 1985; Green and Krasno 1988).

Endogeneity can bias regression coefficient estimates and threaten the validity of statistical inferences. We correct for the potential endogeneity in our model of candidate spending (a continuous variable) with two-stage conditional maximum likelihood (2SCML) and in our model of candidate quality (a dichotomous variable) with two-stage probit least squares (2SPLS).

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With 2SCML, we obtain residuals from an exogenous regression model of candidate spending in which a lagged value of candidate spending is our instrument (Gerber 1998): $spending_t = \square_0 + \square_1 spending_{t-1}$. Lagged spending was statistically significant ($t = 2.14$) in this model, but it was not a statistically significant predictor of competitiveness ($z = -1.21$).

With 2SPLS, we obtained fitted values of candidate quality from an exogenous probit model of the quality challenger variable. We used the ratio of state house and senate representatives in a congressional district as the exogenous predictor of quality challenger ($quality\ challenger = \square_0 + \square_1 meanreps$), since state legislatures are a prime pool of quality challengers to contest congressional seats (Jacobson 2004). Again, the probit coefficient for this instrument was statistically significant ($z = 2.41$), but it did not predict the presence of a competitive race ($z = 1.38$).[15]

*Table A-2.* Probit Estimates for the Impact of Redistricting Method on Competition in United States House Elections, 1992 and 2002—Controlling for Endogeneity

| Variable | Coefficient (Standard Error) | p-value[a] | df/dx[b] |
|---|---|---|---|
| Court | .353 | .010 | .044 |
| | (.151) | | |
| Commission | .316 | .014 | .038 |
| | (.143) | | |
| Quality challenger | –.108 | .401 | — |
| (fitted values) | (.430) | | |
| District partisanship | –.011 | .041 | –.001 |
| | (.006) | | |
| Candidate spending | .789 | .051 | .083 |
| | (.482) | | |
| Candidate spending | .562 | .117 | — |
| (residuals) | (.472) | | |
| Open seat | .507 | .000 | .070 |
| | (.141) | | |
| South | .000 | .499 | .000 |
| | (.140) | | |
| 2002 | –1.162 | .000 | –.132 |
| | (.145) | | |
| Constant | –11.423 | .034 | — |
| | (6.263) | | |
| N | 854 | | |
| Log-Likelihood | –317.15 | | |
| PRE | .43 | | |
| $\chi^2$ | 385.71 | 0.000 | |
| % correctly predicted | 83.84 | | |

[a]One-tailed

[b]Calculated using the dprobit command in Stata 8. This measures the change in the probability for an infinitesimal change in each independent, continuous variable and the discrete change in the probability for dichotomous variables.

*Note:* Estimating the probability of a competitive congressional election, where a race is deemed competitive if the winning candidate received less than 60 percent of the two-party vote in the election subsequent to redistricting.

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After the residuals from the lagged spending model and the fitted challenger quality values were included in and substituted into, respectively, our model of electoral competition, the estimates of the impact of the different redistricting methods do not change much (Table A-2). The court and commission variables are still positive and statistically significant at the same levels as in the unadjusted models. For this reason, we elected to interpret our original results reported in Table 2.

## ENDNOTES

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1. See Hirsch 2003 for a discussion of the results of the 2000 redistricting process. Also, see *Congressional Quarterly's Congressional Districts in the 2000s* and *Congressional Districts in the 1990s* for a description of each state's redistricting plan. We used these books to categorize and describe the types of redistricting plans throughout this article.

2. Butler and Cain (1992) and Kubin (1996–97) have examined the effects of various types of redistricting plans on partisan election outcomes.

3. See Burnham 1974, Ferejohn 1977, and Cox and Katz 2002 for a critique of Tufte 1973.

4. See Gerber 1996 for a more extensive discussion of the effects of institutional arrangements on policy outcomes in state legislatures.

5. This holds for all states except Nebraska, which has a unicameral, nonpartisan legislature.

6. When a state gains House seats through reapportionment, a third goal—that of winning these new seats—also exists (Lyons 2003).

7. In Appendix A, we list the states that used redistricting commissions or courts to create new congressional districts in 1992 and 2002. We also describe our redistricting method coding criteria briefly.

8. See the National Conference of State Legislatures Web site for a list of commission selection requirements (http://www.senate.leg.state.mn.us/departments/scr/redist/red2000/apfcomco.htm).

9. From Article IV, Section 6, of the Hawaii State Constitution.

10. We use this dichotomous dependent variable to be consistent with the extant literature. In an alternative specification of the model, we used the incumbent's two-party vote share as the dependent variable, and our substantive conclusions were largely consistent with what we report here.

11. Given the potential for endogeneity bias in our model from including challenger quality and candidate spending on the right-hand side of the equation (Basinger and Ensley 2003), we used alternative estimation techniques to test the robustness of our model. We address this issue in Appendix B.

12. We use the convention (Jacobson 1980) of assuming that a minimum of $5000 was spent by each candidate.

13. See Ansolabehere, Snyder, and Stewart 2000 and 2001 and Jacobson 2004 for a

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discussion of using district presidential vote as a more direct measure of the partisan predisposition of a congressional district than the popularity of the incumbent representing the district.

14. We also ran an additional analysis with a fixed effect for each state plan, commission and court. In general, most states using these types of plans were more competitive, relative to legislatively drawn plans. However, a small proportion actually showed a decrease or no change in competition. These results, along with a replication dataset, are available at: www.msu.edu/~pipc.

15. There is a trade-off between these two techniques in terms of bias in the coefficients and in the standard errors. 2SPLS produces unbiased coefficients, but the standard errors may be biased, while 2SCML returns unbiased standard errors at the risk of biasing the coefficients (Alvarez and Glasgow 2000). Since these potentially endogenous variables are only control variables in our model, we prefer unbiased standard errors to unbiased coefficients. However, 2SCML cannot be used with a discrete endogenous variable since it requires the use of residuals, something not obtainable from discrete choice models. For a detailed discussion of both techniques, see Alvarez and Glasgow 2000.

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