

STATE OF NORTH CAROLINA  
COUNTY OF WAKE

IN THE GENERAL COURT OF JUSTICE  
SUPERIOR COURT DIVISION  
No. 19-cv-012667

REBECCA HARPER, *et al.*,

Plaintiffs,

v.

DAVID LEWIS, IN HIS OFFICIAL CAPACITY AS SENIOR  
CHAIRMAN OF THE HOUSE SELECT COMMITTEE ON  
REDISTRICTING, *et al.*,

Defendants.

**DECLARATION OF DR.  
JOWEI CHEN**

I, Dr. Jowei Chen, upon my oath, declare and say as follows:

1. I am over the age of eighteen (18) and competent to testify as to the matters set forth herein.
2. I am an Associate Professor in the Department of Political Science at the University of Michigan, Ann Arbor. I am also a Research Associate Professor at the Center for Political Studies of the Institute for Social Research at the University of Michigan and a Research Associate at the Spatial Social Science Laboratory at Stanford University. In 2007, I received a M.S. in Statistics from Stanford University, and in 2009, I received a Ph.D. in Political Science from Stanford University.
3. I have published academic papers on legislative districting and political geography in several political science journals, including The American Journal of Political Science and The American Political Science Review, and Election Law Journal. My academic areas of expertise include legislative elections, spatial statistics, geographic information systems (GIS) data, redistricting, racial politics, legislatures, and political geography. I have expertise in

the use of computer simulations of legislative districting and in analyzing political geography, elections, and redistricting.

4. I have testified either at deposition or at trial in the following cases: *Rene Romo et al. v. Ken Detzner et al.* (Fla. 2d Judicial Cir. Leon Cnty. 2013); *Missouri National Association for the Advancement of Colored People v. Ferguson-Florissant School District and St. Louis County Board of Election Commissioners* (E.D. Mo. 2014); *Raleigh Wake Citizens Association et al. v. Wake County Board of Elections* (E.D.N.C. 2015); *City of Greensboro et al. v. Guilford County Board of Elections* (M.D.N.C. 2015); *Common Cause et al. v. Robert A. Rucho et al.* (M.D.N.C. 2016); *The League of Women Voters of Pennsylvania et al. v. Commonwealth of Pennsylvania et al.* (No. 261 M.D. 2017); *Georgia State Conference of the NAACP et al. v. The State of Georgia et al.* (N.D. Ga. 2017); *The League of Women Voters of Michigan et al. v. Ruth Johnson et al.* (E.D. Mich. 2017); *William Whitford et al. v. Beverly Gill et al.* (W.D. Wis. 2018); *Common Cause et al. v. David Lewis et al.* (N.C. Super. 2019).

5. I have been retained by Plaintiffs in the above-captioned matter. My Curriculum Vitae is attached to this Declaration. I am being compensated \$500 per hour for my work in this case.

6. Plaintiffs' counsel have asked me to analyze the effect of North Carolina's 2016 enacted congressional districting plan (the "2016 Plan") on the partisan composition of the individual Plaintiffs' congressional districts.

7. To analyze this question, I rely upon two sets of simulated congressional districting plans that I have created. I originally created these simulated plans for use in the federal lawsuit *Common Cause v. Rucho*. The simulated plans I use for my analysis in this

Declaration are the same 2,000 simulated plans that comprised my Simulation Set 1 and Simulation Set 2 in *Rucho*.

8. Simulation Set 1 and Simulation Set 2 use the same general approach that I employed in creating simulated state House and state Senate plans in *Common Cause v. Lewis*. Specifically, I instructed the computer to generate congressional districting plans that strictly follow all of the non-partisan criteria enumerated in the February 16, 2016 Adopted Criteria of the Joint Select Committee on Congressional Redistricting (the “2016 Adopted Criteria”).

9. In Simulation Set 1, the computer algorithm created 1,000 independent simulated plans following the five traditional districting criteria from the 2016 Adopted Criteria:

- a) Population Equality: North Carolina’s 2010 Census population was 9,535,483, so districts in the 13-member plan have an ideal population of 733,498.7.

Specifically, then, the computer simulation algorithm populated each districting plan such that precisely nine districts have a population of 733,499, while the remaining four districts have a population of 733,498.

- b) Contiguity: The simulations required districts to be geographically contiguous.

As described in the Adopted Criteria, water contiguity is permissible.

- c) Minimizing County Splits: The simulations avoided splitting any of North Carolina’s 100 counties, except when doing so is necessary to avoid violating one of the aforementioned criteria. Furthermore, as mandated by the 2016 Adopted Criteria, the computer always avoided splitting a county into more than two simulated districts.

- d) Minimizing VTD Splits: North Carolina is divided into 2,692 VTDs. The computer simulation algorithm attempted to keep these VTDs intact and not split

them into multiple districts, except when doing so is necessary for creating equally-populated districts.

- e) Geographic Compactness: The simulation algorithm prioritized the drawing of geographically compact districts whenever doing so does not violate any of the aforementioned criteria.

10. In Simulation Set 2, the computer algorithm created 1,000 independent simulated plans following the same five traditional districting criteria specified above, plus avoiding pairing the incumbents who were in office at the time of the 2016 redistricting.

11. I evaluated the congressional districts in which each Plaintiff would live under the 2,000 computer-simulated using the following list of residential addresses for the Plaintiffs that counsel for the Plaintiffs provided me. I used these addresses to identify the specific district in which each Plaintiff would be located under each computer-simulated plan, as well as under the 2016 Plan.

- a) Amy Clare Oseroff: 119 N Longmeadow Rd. Greenville, NC 27858
- b) Rebecca Harper: 1841 Stonebanks Loop, Cary, NC 27518
- c) David Dwight Brown: 18 Laurel Brook Ct. Greensboro, NC 27407
- d) Joseph Gates: 419 Kyfields, Weaverville, NC 28787
- e) Mark S. Peters: 5 Carter Crest Ln, Fletcher, NC 28732
- f) Virginia Walters Brien: 3028 Airlie St, Charlotte, NC, 28205
- g) John Balla: 7353 Newport Ave., Raleigh, NC 27613
- h) Kathleen Barnes: 392 Sunny Acre Lane, Brevard, NC 28712
- i) Jackson Thomas Dunn, Jr.: 1629 Providence Rd, Charlotte NC 28207
- j) Donald Allan Rumph: 3238 Quail Pointe Dr., Greenville, NC 27858-7335

k) Lily Nicole Quick: 4338 Clovelly Drive, Greensboro, NC 27406

l) Shawn Rush: 104 South Long Street, East Spencer, NC 28144

m) Gettys Cohen: 3 Aspen Dr, Smithfield, NC 27577

n) Richard R. Crews: 1503 Land Harbor, Newland NC, 28657

12. To compare the partisanship of the districts in which each Plaintiff would live under the simulated plans and the 2016 Plan, I use two different measures of partisanship.

13. First, I use the statewide elections specified in the 2016 Adopted Criteria. The 2016 Adopted Criteria state that when evaluating the political composition of congressional districts, the General Assembly would consider “election results in statewide contests since January 1, 2008, not including the last two presidential contests.” There were 20 non-presidential statewide elections between January 1, 2008 and the adoption of the 2016 Plan, and I use these 20 statewide elections to measure the average Democratic vote share in each Plaintiff’s district under the simulated plans and under the 2016 Plan.

14. Second, I use the partisanship formula that Dr. Hofeller disclosed in the *Rucho* case that he had used in drawing the 2016 Plan. The Hofeller formula aggregates together, with equal weights, the partisan results from seven statewide elections: The 2008 Gubernatorial, U.S. Senate, and Commissioner of Insurance elections; the 2010 U.S. Senate election; the 2012 Gubernatorial and Commissioner of Labor elections; and the 2014 U.S. Senate election. I use these seven statewide elections to measure the average Democratic vote share in each Plaintiff’s district under the simulated plans and under the 2016 Plan.

15. Figures 1 to 4 present the results of this analysis. These Figures each list the individual Plaintiffs and describe the partisanship of each Plaintiff’s district of residence in the 2016 Plan, as well as in one of the sets of 1,000 simulated congressional districting plans.

Specifically, Figures 1 and 2 describe each Plaintiff's district of residence in the 2016 House Plan and compare it to the district in which that Plaintiff would reside under each of the 1,000 simulated plans in Simulation Set 1. Figure 1 uses the 20 statewide elections from 2008-2014 to measure the partisanship of districts, and Figure 2 uses the Hofeller formula to measure the partisanship of districts. Figures 3 and 4 repeat this analysis but using Simulation Set 2 rather than Simulation Set 1.

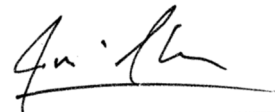
16. To explain these analyses with an example, in Figure 1, each row corresponds to a particular individual Plaintiff. In the first row, describing plaintiff Amy Clare Oseroff, the red star depicts the partisanship of the Plaintiff's 2016 Plan district (CD-1), as measured by Democratic vote share using the 20 statewide elections from 2008-2014. The 1,000 gray circles on this row depict the Democratic vote share of each of the 1,000 simulated districts in which the Plaintiff would reside in each of the 1,000 simulated plans in Simulation Set 1, based on that Plaintiff's current home address. In the far right margin, to the right of each row, I list in parentheses how many of the 1,000 simulated plans would place the plaintiff in a more Republican-leaning district (on the left) and how many of the 1,000 simulations would place the plaintiff in a more Democratic-leaning district (on the right) than the Plaintiff's 2016 Plan district. Thus, for example, the first row of Figure 1 reports that 100% of the 1,000 computer-simulated plans in Simulation Set 1 would place Plaintiff Amy Clare Oseroff in a less Democratic-leaning district than her actual 2016 Plan district (CD-1). Therefore, I can conclude that Oseroff's 2016 Plan district is a partisan statistical outlier when compared to her district under the 1,000 Simulation Set 1 plans.

17. Figures 1 and 2 show that nine Plaintiffs who currently live in Republican-leaning districts would live in a more Democratic district in at least 91% of the 1,000 Simulation Set 1

plans (Cohen, Quick, Rumph, Dunn, Barnes, Peters, Gates, Brown, and Harper). Figures 1 and 2 show that the remaining five Plaintiffs would live in a less Democratic district in at least 86% of the Simulation Set 1 plans (Oseroff, Rush, Crews, Balla, and Brien), and three of these five Plaintiffs are extreme outliers above the 98% level. Figures 3 and 4 show largely similar results for Simulation Set 2.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

This 30th day of September, 2019.

A handwritten signature in black ink, appearing to read 'J. Chen', with a horizontal line extending to the right.

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Dr. Jowei Chen

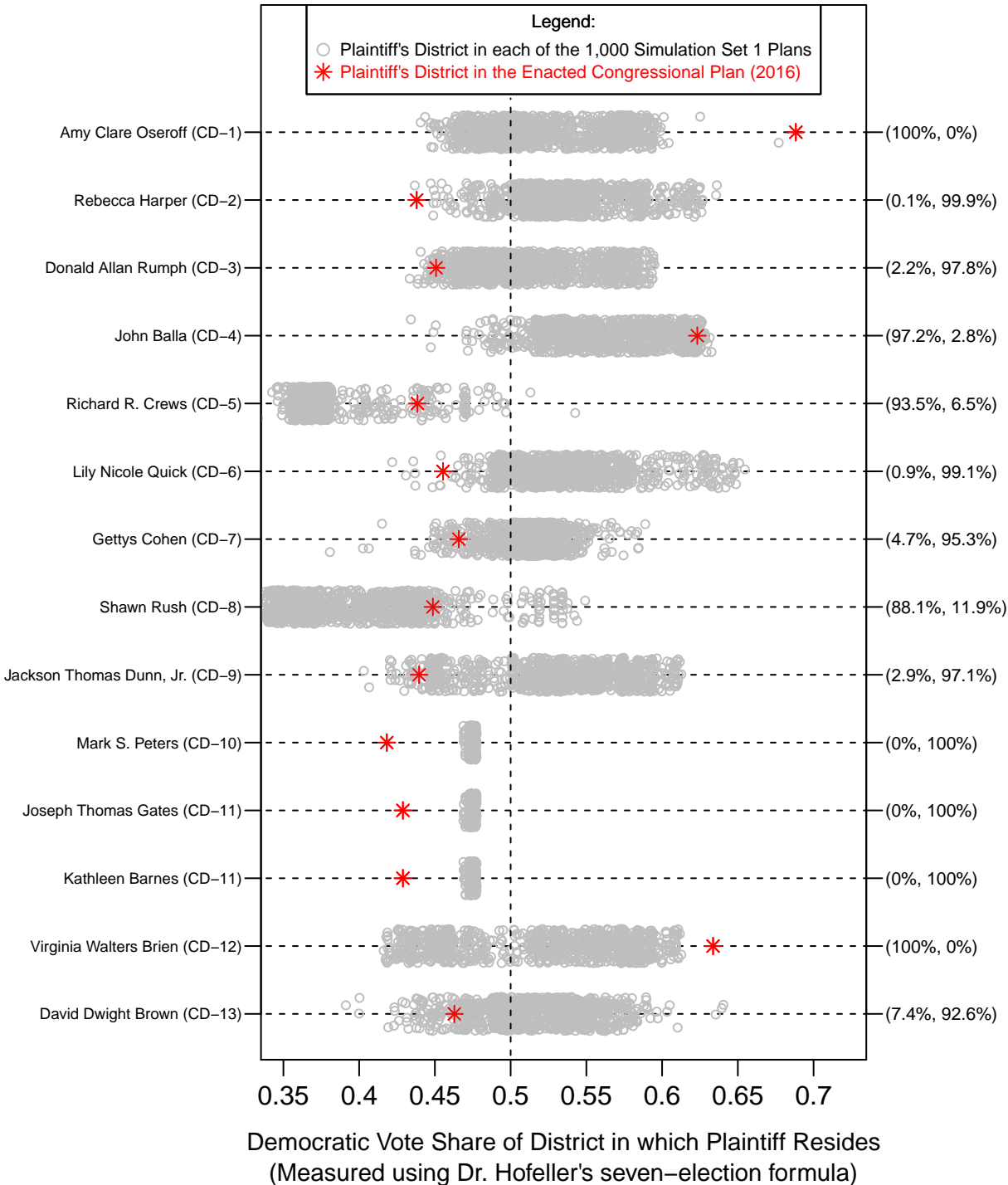
# Simulation Set 1



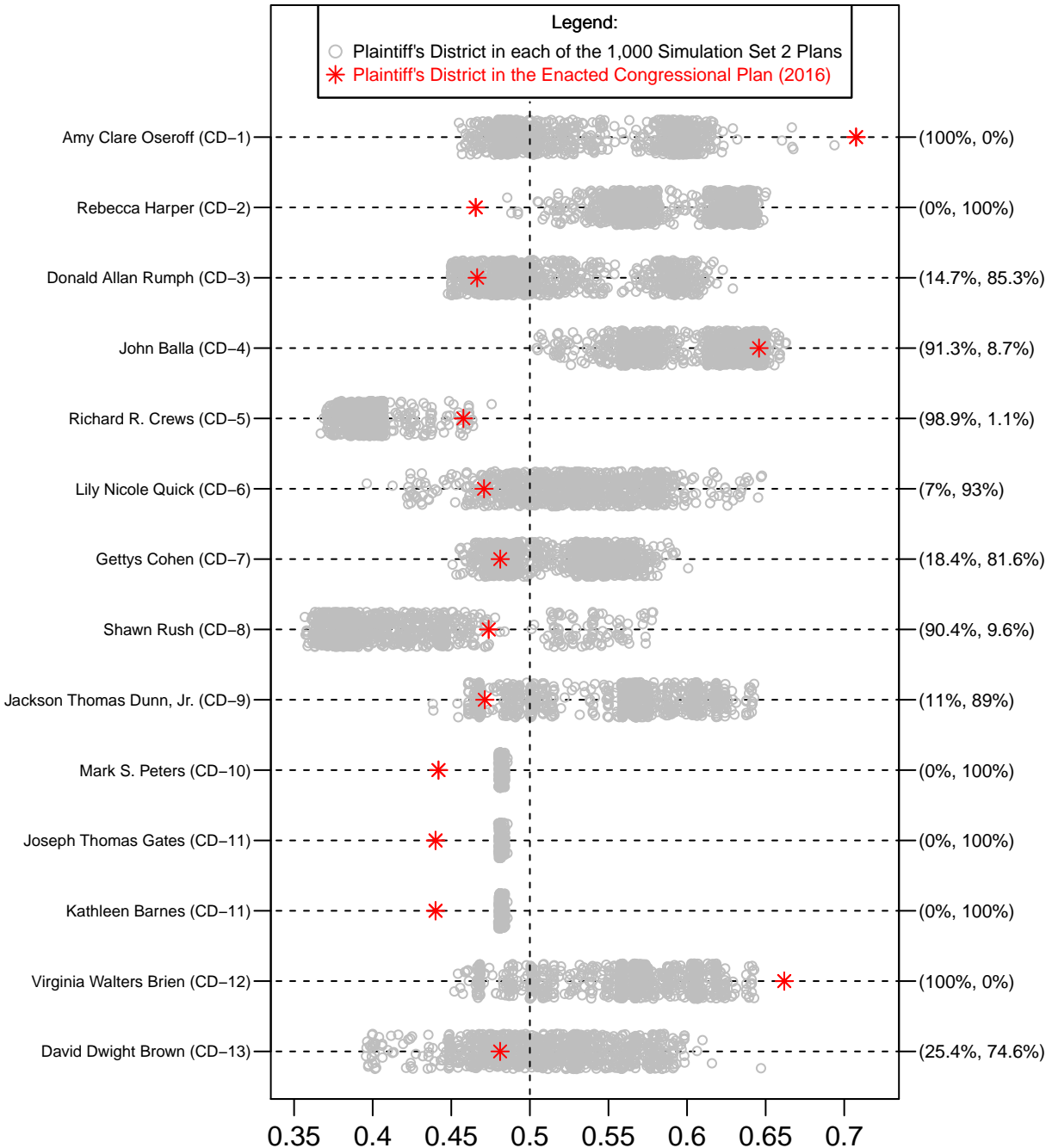
Democratic Vote Share of District in which Plaintiff Resides  
(Measured using votes summed across all 20 statewide elections during 2008–2014)



# Simulation Set 1

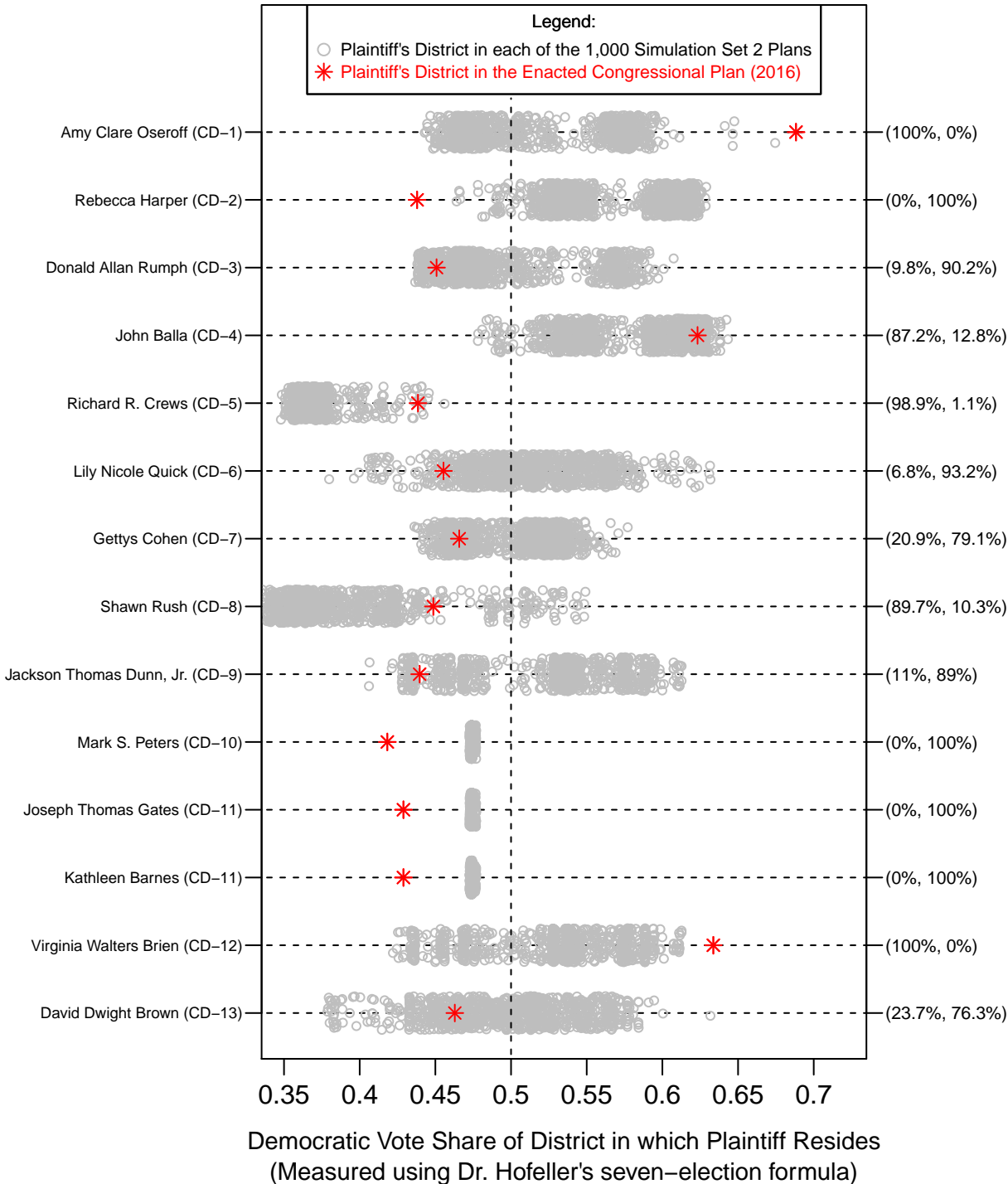


# Simulation Set 2



Democratic Vote Share of District in which Plaintiff Resides  
(Measured using votes summed across all 20 statewide elections during 2008–2014)

# Simulation Set 2



**Jowei Chen**  
**Curriculum Vitae**

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University of Michigan  
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Ann Arbor, MI 48109-1045  
Phone: 917-861-7712, Email: [jowei@umich.edu](mailto:jowei@umich.edu)  
Website: <http://www.umich.edu/~jowei>

**Academic Positions:**

Associate Professor (2015-present), Assistant Professor (2009-2015), Department of Political Science, University of Michigan.  
Faculty Associate, Center for Political Studies, University of Michigan, 2009 – Present.  
W. Glenn Campbell and Rita Ricardo-Campbell National Fellow, Hoover Institution, Stanford University, 2013.  
Principal Investigator and Senior Research Fellow, Center for Governance and Public Policy Research, Willamette University, 2013 – Present.

**Education:**

Ph.D., Political Science, Stanford University (June 2009)  
M.S., Statistics, Stanford University (January 2007)  
B.A., Ethics, Politics, and Economics, Yale University (May 2004)

**Publications:**

Chen, Jowei and Neil Malhotra. 2007. “The Law of k/n: The Effect of Chamber Size on Government Spending in Bicameral Legislatures.”

[\*American Political Science Review\*, 101\(4\): 657-676.](#)

Chen, Jowei, 2010. “The Effect of Electoral Geography on Pork Barreling in Bicameral Legislatures.”

[\*American Journal of Political Science\*, 54\(2\): 301-322.](#)

Chen, Jowei, 2013. “Voter Partisanship and the Effect of Distributive Spending on Political Participation.”

[\*American Journal of Political Science\*, 57\(1\): 200-217.](#)

Chen, Jowei and Jonathan Rodden, 2013. “Unintentional Gerrymandering: Political Geography and Electoral Bias in Legislatures”

[\*Quarterly Journal of Political Science\*, 8\(3\): 239-269.](#)

Bradley, Katharine and Jowei Chen, 2014. "Participation Without Representation? Senior Opinion, Legislative Behavior, and Federal Health Reform."

[Journal of Health Politics, Policy and Law. 39\(2\), 263-293.](#)

Chen, Jowei and Tim Johnson, 2015. "Federal Employee Unionization and Presidential Control of the Bureaucracy: Estimating and Explaining Ideological Change in Executive Agencies."

[Journal of Theoretical Politics, Volume 27, No. 1: 151-174.](#)

Bonica, Adam, Jowei Chen, and Tim Johnson, 2015. "Senate Gate-Keeping, Presidential Staffing of 'Inferior Offices' and the Ideological Composition of Appointments to the Public Bureaucracy."

[Quarterly Journal of Political Science. Volume 10, No. 1: 5-40.](#)

Chen, Jowei and Jonathan Rodden, 2015. "Cutting Through the Thicket: Redistricting Simulations and the Detection of Partisan Gerrymanders."

[Election Law Journal. Volume 14, Number 4: 331-345.](#)

Chen, Jowei and David Cottrell, 2016. "Evaluating Partisan Gains from Congressional Gerrymandering: Using Computer Simulations to Estimate the Effect of Gerrymandering in the U.S. House."

[Electoral Studies. Volume 44 \(December 2016\): 329-340.](#)

Chen, Jowei, 2017. "Analysis of Computer-Simulated Districting Maps for the Wisconsin State Assembly."

[Election Law Journal. Volume 16, Number 4 \(December 2017\): 417-442.](#)

#### **Non-Peer-Reviewed Publication:**

Chen, Jowei and Tim Johnson. 2017. "Political Ideology in the Bureaucracy."

[Global Encyclopedia of Public Administration, Public Policy, and Governance.](#)

Chen, Jowei. October 4, 2017. Time Magazine Op-Ed.

<http://time.com/4965673/wisconsin-supreme-court-gerrymandering-research/>

Chen, Jowei and Jonathan Rodden. January 2014. New York Times Op-Ed.

<https://www.nytimes.com/2014/01/26/opinion/sunday/its-the-geography-stupid.html>

#### **Research Grants:**

Principal Investigator. [National Science Foundation Grant SES-1459459](#), September 2015 – August 2018 (\$165,008). "The Political Control of U.S. Federal Agencies and Bureaucratic Political Behavior."

"Economic Disparity and Federal Investments in Detroit," (with Brian Min) 2011. Graham Institute, University of Michigan (\$30,000).

“The Partisan Effect of OSHA Enforcement on Workplace Injuries,” (with Connor Raso) 2009.  
John M. Olin Law and Economics Research Grant (\$4,410).

**Invited Talks:**

September, 2011. University of Virginia, American Politics Workshop.  
October 2011. Massachusetts Institute of Technology, American Politics Conference.  
January 2012. University of Chicago, Political Economy/American Politics Seminar.  
February 2012. Harvard University, Positive Political Economy Seminar.  
September 2012. Emory University, Political Institutions and Methodology Colloquium.  
November 2012. University of Wisconsin, Madison, American Politics Workshop.  
September 2013. Stanford University, Graduate School of Business, Political Economy Workshop.  
February 2014. Princeton University, Center for the Study of Democratic Politics Workshop.  
November 2014. Yale University, American Politics and Public Policy Workshop.  
December 2014. American Constitution Society for Law & Policy Conference: Building the Evidence to Win Voting Rights Cases.  
February 2015. University of Rochester, American Politics Working Group.  
March 2015. Harvard University, Voting Rights Act Workshop.  
May 2015. Harvard University, Conference on Political Geography.  
October 2015. George Washington University School of Law, Conference on Redistricting Reform.  
September 2016. Harvard University Center for Governmental and International Studies, Voting Rights Institute Conference.  
March 2017. Duke University, Sanford School of Public Policy, Redistricting Reform Conference.  
October 2017. Willamette University, Center for Governance and Public Policy Research  
October 2017, University of Wisconsin, Madison. Geometry of Redistricting Conference.  
February 2018: University of Georgia Law School  
September 2018. Willamette University.  
November 2018. Yale University, Redistricting Workshop.  
November 2018. University of Washington, Severyns Ravenholt Seminar in Comparative Politics.  
January 2019. Duke University, Reason, Reform & Redistricting Conference.  
February 2019. Ohio State University, Department of Political Science. Departmental speaker series.

**Conference Service:**

Section Chair, 2017 APSA (Chicago, IL), Political Methodology Section  
Discussant, 2014 Political Methodology Conference (University of Georgia)  
Section Chair, 2012 MPSA (Chicago, IL), Political Geography Section.  
Discussant, 2011 MPSA (Chicago, IL) “Presidential-Congressional Interaction.”  
Discussant, 2008 APSA (Boston, MA) “Congressional Appropriations.”  
Chair and Discussant, 2008 MPSA (Chicago, IL) “Distributive Politics: Parties and Pork.”

### **Conference Presentations and Working Papers:**

“Ideological Representation of Geographic Constituencies in the U.S. Bureaucracy,” (with Tim Johnson). 2017 APSA.

“Incentives for Political versus Technical Expertise in the Public Bureaucracy,” (with Tim Johnson). 2016 APSA.

“Black Electoral Geography and Congressional Districting: The Effect of Racial Redistricting on Partisan Gerrymandering”. 2016 Annual Meeting of the Society for Political Methodology (Rice University)

“Racial Gerrymandering and Electoral Geography.” Working Paper, 2016.

“Does Deserved Spending Win More Votes? Evidence from Individual-Level Disaster Assistance,” (with Andrew Healy). 2014 APSA.

“The Geographic Link Between Votes and Seats: How the Geographic Distribution of Partisans Determines the Electoral Responsiveness and Bias of Legislative Elections,” (with David Cottrell). 2014 APSA.

“Gerrymandering for Money: Drawing districts with respect to donors rather than voters.” 2014 MPSA.

“Constituent Age and Legislator Responsiveness: The Effect of Constituent Opinion on the Vote for Federal Health Reform.” (with Katharine Bradley) 2012 MPSA.

“Voter Partisanship and the Mobilizing Effect of Presidential Advertising.” (with Kyle Dropp) 2012 MPSA.

“Recency Bias in Retrospective Voting: The Effect of Distributive Benefits on Voting Behavior.” (with Andrew Feher) 2012 MPSA.

“Estimating the Political Ideologies of Appointed Public Bureaucrats,” (with Adam Bonica and Tim Johnson) 2012 Annual Meeting of the Society for Political Methodology (University of North Carolina)

“Tobler’s Law, Urbanization, and Electoral Bias in Florida.” (with Jonathan Rodden) 2010 Annual Meeting of the Society for Political Methodology (University of Iowa)

“Unionization and Presidential Control of the Bureaucracy” (with Tim Johnson) 2011 MPSA.

“Estimating Bureaucratic Ideal Points with Federal Campaign Contributions” 2010 APSA. (Washington, DC).

“The Effect of Electoral Geography on Pork Spending in Bicameral Legislatures,” Vanderbilt University Conference on Bicameralism, 2009.

“When Do Government Benefits Influence Voters’ Behavior? The Effect of FEMA Disaster Awards on US Presidential Votes,” 2009 APSA (Toronto, Canada).

“Are Poor Voters Easier to Buy Off?” 2009 APSA (Toronto, Canada).

“Credit Sharing Among Legislators: Electoral Geography’s Effect on Pork Barreling in Legislatures,” 2008 APSA (Boston, MA).

“Buying Votes with Public Funds in the US Presidential Election,” Poster Presentation at the 2008 Annual Meeting of the Society for Political Methodology (University of Michigan).

“The Effect of Electoral Geography on Pork Spending in Bicameral Legislatures,” 2008 MPSA.

“Legislative Free-Riding and Spending on Pure Public Goods,” 2007 MPSA (Chicago, IL).

“Free Riding in Multi-Member Legislatures,” (with Neil Malhotra) 2007 MPSA (Chicago, IL).

“The Effect of Legislature Size, Bicameralism, and Geography on Government Spending: Evidence from the American States,” (with Neil Malhotra) 2006 APSA (Philadelphia, PA).

**Reviewer Service:**

American Journal of Political Science  
American Political Science Review  
Journal of Politics  
Quarterly Journal of Political Science  
American Politics Research  
Legislative Studies Quarterly  
State Politics and Policy Quarterly  
Journal of Public Policy  
Journal of Empirical Legal Studies  
Political Behavior  
Political Research Quarterly  
Political Analysis  
Public Choice  
Applied Geography