I, M.V. Hood III, affirm the conclusions I express in this report are provided to a reasonable degree of professional certainty. I reserve the right to update the opinions contained herein prior to trial. In addition, I do hereby declare the following:
I. INTRODUCTION AND BACKGROUND

My name is M.V. (Trey) Hood III, and I am a tenured professor at the University of Georgia with an appointment in the Department of Political Science. I have been a faculty member at the University of Georgia since 1999. I also serve as the Director of the School of Public and International Affairs Survey Research Center. I am an expert in American politics, specifically in the areas of electoral politics, racial politics, election administration, and Southern politics. I teach courses on American politics, Southern politics, and research methods and have taught graduate seminars on the topics of election administration and Southern politics.

I have received research grants from the National Science Foundation and the Pew Charitable Trust. I have also published peer-reviewed journal articles specifically in the area of election administration, including redistricting. My academic publications are detailed in a copy of my vita that is attached to the end of this document. Currently, I serve on the editorial boards for *Social Science Quarterly* and *Election Law Journal*. The latter is a peer-reviewed academic journal focused on the area of election administration.


In assisting the Defendants in analyzing North Carolina's 2016 congressional redistricting plan, I am receiving $325 an hour for this work and $325 an hour for any testimony associated with this work. In reaching my conclusions, I have drawn on my training, experience, and knowledge as a social scientist who has specifically conducted research in the area of redistricting.
II. SCOPE AND OVERVIEW

I have been asked by counsel for the Defendants to respond to the expert reports of Professor Simon Jackman and Professor Jowei Chen; specifically their opinions regarding North Carolina’s 2016 congressional redistricting plan. Section III provides a political overview of North Carolina. The following section (IV) specifically examines the 2016 congressional redistricting plan. Within the context of the 2016 plan partisan characteristics are investigated in Section V. The final section of my report (VI) provides a synopsis of my overall conclusions in this case.
III. THE NORTH CAROLINA POLITICAL SCENE

In this section I discuss recent electoral and party politics and political geography in North Carolina. While redistricting can help or hurt a political party’s fortune, it is not the only factor related to electoral success. One overarching factor in the state’s politics concerns the decades-long party realignment that has taken place around the civil rights issue beginning in the mid-1960’s. Like other states in the region, North Carolina has moved from one-party politics under the Democratic Party to a viable two-party competitive state.\(^1\) Today, within this structure one might even say Republicans have a political edge in North Carolina based on recent election outcomes at various officeholding levels.\(^2\)

Changing Partisan Balance in the State

Figure 1 below tracks the number of General Assembly seats held by the Republicans from 1990 through 2016.\(^3\) While I fully recognize that the North Carolina Legislature is not the subject of the present litigation, it nevertheless provides some insight into recent political contours of the state. Looking at Figure 1 what becomes quickly clear is the fact that the percentage of Republicans in the General Assembly has been increasing in a slow and steady march over the last three decades. The vertical black lines indicate the presence of a decennial redistricting. Note that in 1990 and 2000 Republicans constituted less than a majority of both houses and, therefore, did not control redistricting legislation. However, by 2010 the GOP had gained a majority in both houses of the General Assembly, placing them in control of the redistricting process. The point of this exercise is to demonstrate the changing electoral fortunes in North Carolina along with the fact that the GOP majority in the legislature did not rest on control of the redistricting process. Between 1990 and 2010 the number of Republican seats in the state House went from 39 to 67 and in the state Senate from 14 to 31. These seat increases then could be said to have occurred in spite of redistricting, not because of redistricting. The fact is that until 2010 Democrats controlled the redistricting process in North Carolina. It is clear from this illustration that factors beyond simply redistricting certainly contribute to electoral outcomes as well as the partisan distribution of seats. Again, the long-term partisan realignment comes to mind as one of the chief drivers underlying such change.

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\(^2\)For example, at the local level Republicans hold a majority of North Carolina’s county commission seats (55% in 2016). Source: North Carolina Association of County Commissioners (www.ncacc.org/196/Makeup-of-County-Boards-by-Decade).

\(^3\)Data source: *Book of the States*, various years (http://knowledgecenter.csg.org/kc/category/content-type/content-type/book-states).
Figure 1. Republican Seat Share in the North Carolina General Assembly
The 2016 Congressional Elections in North Carolina

Current Republican success in holding ten of thirteen congressional seats in the state is not due solely then to the redistricting process. As explained in the section below on the 2016 congressional redistricting, one of the goals set out in the criteria adopted by the General Assembly concerned incumbent protection. As indicated, to a large degree this goal was accomplished. Although the districts were obviously reconfigured from 2011 to 2016, eleven out of thirteen (or 84.6%) districts retained their incumbent from the 2014 election-cycle. One member, George Holding saw his former district (CD 13) shifted across the state. Holding decided, however, to run in the new 2nd District given more than 60% of his old constituents were located there. He went on to defeat Ellmers in the Republican Primary and to eventually win the general election against a Democratic opponent. Given the overlap of his former constituency with the new 2nd District and his position as a House member, Holding may not have been an incumbent in the traditional sense of the term, but in this special circumstance he could certainly be considered the incumbent. That said, in the 2016 election-cycle only the 13th District was genuinely an open seat.

With most of the 2016 races featuring an incumbent who has retained a large degree of their former constituents (see section on the 2016 Congressional Redistricting below) it is no surprise that the partisan balance in North Carolina’s congressional delegation remained the same from 2014 to 2016. Incumbents are highly likely to win reelection, especially when faced with challengers of little or no political experience. Of the twelve incumbent races in 2016, 10 (or 83%) featured a challenger with no political experience (see Table 1). Two other races featured challengers with limited political experience. The challenger in District 1 had been elected to the Stantonsburg City Council (Population: 784), while in the 11th District race the challenger had been elected as a Bryson City Alderman (Population: 1,424).

5In fact, campaign finance disclosures with the FEC do list Holding as the incumbent for District 2 (www.fec.gov).
6Here I am using a common measurement in political science which examines whether a challenger has held prior elective office.
7Population figures from U.S. Census (https://factfinder.census.gov/).
Table 1. 2016 North Carolina Congressional Elections-Challenger Experience

<table>
<thead>
<tr>
<th>District</th>
<th>Winner</th>
<th>Incumbent Party</th>
<th>Challenger Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>D</td>
<td>D</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>R</td>
<td>R</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>R</td>
<td>R</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>D</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>R</td>
<td>R</td>
<td>No</td>
</tr>
<tr>
<td>6</td>
<td>R</td>
<td>R</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>R</td>
<td>R</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>R</td>
<td>R</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>R</td>
<td>R</td>
<td>No</td>
</tr>
<tr>
<td>10</td>
<td>R</td>
<td>R</td>
<td>No</td>
</tr>
<tr>
<td>11</td>
<td>R</td>
<td>R</td>
<td>Yes</td>
</tr>
<tr>
<td>12</td>
<td>D</td>
<td>D</td>
<td>No</td>
</tr>
<tr>
<td>13</td>
<td>R</td>
<td>Open</td>
<td>No (neither candidate)</td>
</tr>
</tbody>
</table>

In addition to the political experience of challengers, campaign spending can be used as another measure of electoral competition. Table 2 below details candidate expenditures as reported to the Federal Election Commission for the 2016 election-cycle.\(^8\) In every race featuring an incumbent, the incumbent outspent their challenger by an average of $1.2 million. In the only open seat race (CD 13), the Republican candidate outspent the Democratic candidate by $1.15 million. Given this, it is no surprise that the GOP captured this seat in 2016.

Table 2. 2016 North Carolina Congressional Elections-Candidate Spending

<table>
<thead>
<tr>
<th>District</th>
<th>Incumbent Party</th>
<th>Republican Expenditures</th>
<th>Democratic Expenditures</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>D</td>
<td>$21,148</td>
<td>$857,160</td>
<td>$836,012</td>
</tr>
<tr>
<td>2</td>
<td>R</td>
<td>$2,786,514</td>
<td>$83,558</td>
<td>$2,702,956</td>
</tr>
<tr>
<td>3</td>
<td>R</td>
<td>$695,578</td>
<td>$0</td>
<td>$695,578</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>$78,678</td>
<td>$793,951</td>
<td>$715,273</td>
</tr>
<tr>
<td>5</td>
<td>R</td>
<td>$1,205,016</td>
<td>$0</td>
<td>$1,205,016</td>
</tr>
<tr>
<td>6</td>
<td>R</td>
<td>$93,299</td>
<td>$697,129</td>
<td>$603,830</td>
</tr>
<tr>
<td>7</td>
<td>R</td>
<td>$14,887</td>
<td>$742,685</td>
<td>$727,798</td>
</tr>
<tr>
<td>8</td>
<td>R</td>
<td>$2,445,102</td>
<td>$400,287</td>
<td>$2,044,815</td>
</tr>
<tr>
<td>9</td>
<td>R</td>
<td>$1,210,766</td>
<td>$59,507</td>
<td>$1,151,259</td>
</tr>
<tr>
<td>10</td>
<td>R</td>
<td>$2,670,567</td>
<td>$391,349</td>
<td>$2,279,218</td>
</tr>
<tr>
<td>11</td>
<td>R</td>
<td>$625,816</td>
<td>$47,956</td>
<td>$577,860</td>
</tr>
<tr>
<td>12</td>
<td>D</td>
<td>$41,628</td>
<td>$844,476</td>
<td>$802,848</td>
</tr>
<tr>
<td>13</td>
<td>Open</td>
<td>$591,736</td>
<td>$75,777</td>
<td>$515,959</td>
</tr>
</tbody>
</table>

\(^8\)Campaign expenditure data from the Federal Election Commission (www.fec.gov).
One other point to be made concerning the 2016 election-cycle was the shortened schedule. Due to litigation in the *Harris* case, the new congressional map was approved by the General Assembly on February 19, 2016. The state postponed congressional primary elections until June 7, 2016. The candidate filing deadline was set to end March 25, 2016. Thus, there were only 36 days between approval of the map and the deadline for candidate filing and three months and nineteen days between approval and the June primary date. Such a compressed time frame certainly favored congressional incumbents over potential challengers, who had very little time to mount full scale campaigns.

Twelve of thirteen congressional races in 2016 featured an incumbent who was reelected. This is the typical pattern observed nationwide. Although all twelve of these districts were contested, evidence collected indicates that these incumbents did not face experienced challengers. Incumbents also possessed a much higher level of financial resources as compared to challengers. Finally, challengers had very little time to respond to the shortened election timeline imposed by the new district map approved for the 2016 election cycle. In the case of the one open seat (CD 13) the Republican candidate was clearly able to mobilize more resources, outspending their Democratic opponent by a ratio of nearly 8 to 1. This factor contributed to a GOP win in that district.

One can attempt to engineer election outcomes via the redistricting process. As demonstrated, however, actual election outcomes are the result of a number of factors that occur beyond redistricting. In fact, past efforts designed to pick up seats for the party in charge of the redistricting process do not always pan out as planned. In conclusion, there is little doubt that factors other than redistricting related to the 2016 elections in North Carolina helped to produce the noted ten to three partisan division.

**North Carolina’s Political Geography**

In this section I discuss the political geography of North Carolina and how this factor interacts with the process of drawing districts in the state. In order to do so I created my own partisan index based on recent contested races. More specifically, I calculated the Republican share of the two-party vote from eleven statewide races at the VTD level. Using GIS, I was able to

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10The advantages that congressional incumbents enjoy over challengers and the very high incumbency reelection rate are well documented in the political science literature. In 2014 the incumbent reelection rate for U.S. House members was 95%, while the post-World War II reelection reelection rate is 90%. For a general synopsis of these topics see Gary C. Jacobson and Jamie L. Carson. 2016. *The Politics of Congressional Elections, 9th ed.* Lanham, MD: Rowman and Littlefield.

11For example, see M.V. Hood III and Seth C. McKee. 2009. “Trying to Thread the Needle: The Effects of Redistricting in a Georgia Congressional District. *PS: Political Science & Politics* 42(4): 679-687. In the case a congressional redistricting plan clearly designed to unseat two incumbent Democrats clearly failed in that effort.

12The exact formula I used is as follows: 

\[ \frac{\sum_{i=1}^{11} (R) \text{Votes for 2010 U.S. Senate} + (R) \text{Votes for 2012 Governor} + (R) \text{Votes for 2012 Lt. Governor} + (R) \text{Votes for 2012 Auditor} + (R) \text{Votes for 2012 Ag. Commissioner} + (R) \text{Votes for 2012 Insurance Commissioner} + (R) \text{Votes for 2012 Labor Commissioner} + (R) \text{Votes for 2012 Secretary of State} + (R) \text{Votes for 2012 School Superintendent} + (R) \text{Votes for 2014 U.S. Senate}}{\sum_{i=1}^{11} \text{Total Two-Party Vote for 2010 U.S. Senate} + \text{Total Two-Party Vote for 2012 Governor} + \text{Total Two-Party Vote for 2012 Lt. Governor} + \text{Total Two-Party Vote for 2012 Auditor} + \text{Total Two-Party Vote for 2012 Ag. Commissioner} + \text{Total Two-Party Vote for 2012 Insurance Commissioner}} \]
categorize and plot these VTDs along with their partisan index score. Since the partisan index is based on the two-party vote share, it can be easily partitioned into four categories: Strong Democrat (0.0%-24.9%); weak Democrat (25.0%-49.9%); weak Republican (50.0%-74.9%); and strong Republican (75.0% to 100%). To visually represent these categories VTDs are shaded dark blue for strong Democrat; light blue for weak Democrat; light red for weak Republican; and dark red for strong Republican. This map is presented in Figure 2. The purpose of this exercise is to graphically demonstrate the distribution of partisans across North Carolina. In addition, the map also contains white boundary lines which denote subregions within the state. The identified subregions are the mountain (highlands), piedmont, coastal plain, and tidewater areas.13

13These political subregions for North Carolina are outlined in V.O. Key Jr.’s seminal work *Southern Politics in State and Nation* (1949, Alfred A. Knopf). It is possible, of course, to subdivide the state in a variety of ways. For purpose of illustration I simply rely on Key’s identification of subregions as one possibility.
Figure 2. North Carolina Partisan Distribution
Clustering of partisans can lead to natural packing of such groups in the redistricting process.\textsuperscript{14} To the extent then that Republican VTDs tend to be geographically located next to one another and Democratic VTDs are spatially proximate, the more likely the redistricting process may be impacted by such geographic considerations.\textsuperscript{15} Looking at Figure 2 visually, it is easy to pick up on such clustering. Democrats appear to be located in urban areas (e.g. Charlotte, Asheville, Winston-Salem, Greensboro, Durham, and Raleigh) and within the blackbelt\textsuperscript{16} area of the state that runs through the coastal plain subregion. On the other hand, Republican partisans are much more geographically dispersed, producing a larger footprint within the state. GOP adherents occupy large swaths of the mountain, piedmont, and coastal plain subregions. In order to get a clearer picture on the spatial distribution of partisanship in North Carolina, more specific statistics are presented in Table 3.

Table 3. North Carolina Geographic Comparisons

<table>
<thead>
<tr>
<th>Area</th>
<th>Percent Republican</th>
<th>Moran’s I</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>50.0%</td>
<td>.43*</td>
</tr>
<tr>
<td>Mountain</td>
<td>53.7%</td>
<td>.76*</td>
</tr>
<tr>
<td>Piedmont</td>
<td>50.0%</td>
<td>.56*</td>
</tr>
<tr>
<td>Coastal Plain</td>
<td>44.3%</td>
<td>.39*</td>
</tr>
<tr>
<td>Tidewater</td>
<td>56.6%</td>
<td>.31*</td>
</tr>
</tbody>
</table>

*Significant at p<.01.

Aggregating the partisan index previously discussed by different geographic areas helps to quantify the visual picture presented in the previous map. Statewide, the index shows a 50/50 split by party. Within North Carolina, however, there is geographic variance as indicated when examining partisanship by subregion. Republicans constitute a majority in the mountain and tidewater areas. The piedmont is evenly split in terms of the partisan vote distribution, while Democrats constitute a majority in the coastal plain subregion.

The second statistic presented in the table, Moran’s I, is a measure of spatial autocorrelation ranging from -1 to 1.\textsuperscript{17} Positive values signal the presence of spatial autocorrelation (which can be thought of as the clustering of geographic units with similar values). In the present case, this is an indication of spatial proximity for VTDs with comparable values on the partisan index. In plainer English, VTDs with a similar partisanship makeup appear to be geographically clustered in North Carolina. Values for Moran’s I in Table 3 are all positive and significant, statistical evidence buttressing the claim that partisans are geographically clustered within the state.

\textsuperscript{14}I am not arguing against the fact that population equality is the overarching criteria on which congressional districts are based. On the other hand, one cannot ignore the fact that these districts are affected by spatial considerations. See \textit{Vieth v. Jubelirer}, 541 U.S. 267 (2004) for discussion of the concept of natural packing.


\textsuperscript{16}See again Key (1949).

Moran’s I examines groupings of geographic units based on a particular characteristic (in this case the partisan index). It does not, however, take into account the degree to which units with higher values cluster together with higher values and, conversely, units with lower value cluster together with other units possessing lower values. In this case, it might be useful to know if Republican VTDs geographically cluster with other Republican VTDs and if Democratic VTDs lie in close proximity with other Democratic VTDs. The next map presents the results of a spatial cluster analysis designed to detect such pairings.\textsuperscript{18} Sometimes called a hotspot analysis, the map plots clusters of Republican VTDs red (high values on partisan index) and clusters of Democratic VTDs in blue (low values on partisan index).

Figure 3. North Carolina Partisan Cluster Analysis
Looking at the map (Figure 3) one can see that large sections of North Carolina are occupied by either Republican or Democratic clusters. Urban areas within the state reveal prominent clusters of Democratic strength. A second area of concentrated Democratic strength lies in the two rural pockets in the coastal plain (one in the north of the subregion and one in the south). Republican clusters are located in rural areas covering large areas in the west and central parts of the state (mountain and piedmont subregions). Secondary GOP clusters are located in the central part of the piedmont and along the central and southern coastal areas of the tidewater.

Before moving on to another topic, the final component of this section examines the relationship between urban areas and Democratic partisanship. As a proxy to denote urban areas I rely on population density. This measure was created by dividing the voting age population contained within each VTD by the area of the VTD (measured in square miles). I then created a new indicator by subtracting values on the partisan index from one. Now, higher values indicate increasing Democratic vote strength. In order to test the relationship between population density and Democratic partisanship I used OLS regression. The results are found in Table 4 below.19

<table>
<thead>
<tr>
<th>Table 4. Explaining Democratic Partisanship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
</tr>
<tr>
<td>Population Density</td>
</tr>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>R²</td>
</tr>
<tr>
<td>N</td>
</tr>
</tbody>
</table>

As indicated by the results in the table, population density is a significant predictor of Democratic vote strength in North Carolina. As population density increases, so does Democratic partisanship. Stated otherwise, Democrats in the state are more likely to be located in urban areas. Of course, this is just further statistical confirmation of the spatial patterns that were previously discussed.

To recap, this section has demonstrated that North Carolina’s political geography can affect the manner in which congressional districts are created. Geographically speaking, Republican areas tend to cluster with other Republican areas and Democratic areas tend to be located alongside other Democratic areas. As well, Democrats are more likely to be found in urban areas and Republicans in rural areas. As a consequence of this pattern Republicans possess a larger geographic footprint in the state than do Democrats. The presence of such spatial patterns can lead to the phenomenon where partisans are more likely to be placed together in the same district, sometimes referred to as natural packing.

*Tar Heel Politics and the Efficiency Gap Measure*

The Republican Party has also been able to secure a majority of the two-party vote statewide consistently in contemporary election cycles. Some examples include the 2016 presidential election (51.9%); the 2016 U.S. Senate contest (53.0%); the 2014 U.S. Senate contest (50.8%);

19Alternative model specifications using the logged value of population density and weighting observations by VAP revealed the same pattern as that presented in Table 4.
the 2012 presidential race (51.0%); and the 2012 gubernatorial contest (55.8%). Given this, should one be surprised that the Republicans presently hold a majority of the U.S. House seats? Consistently holding a majority of congressional seats without having ever secured a majority of the statewide vote might raise some eyebrows. But again, this does not describe the present situation. For the plaintiffs, the question appears to be just how many seats can a party hold beyond a bare majority? In the present case would it be acceptable for the Republicans to hold seven seats? What about eight? Per the current litigation ten would appear to be too many (at least according to the plaintiffs).

One key point to emphasize at this juncture concerns the fact that congressional districts are not necessarily microcosms of the state at large. A congressional district may have a very different political makeup as compared to the state as a whole or surrounding districts. As well, congressional elections are, themselves, separate affairs from other races on the ballot, including those for statewide office. Outside the partisan makeup of a district, there are many factors which may influence election outcomes. Among these, the candidates running in the race, the presence of an incumbent, resources available (money, political experience), and messaging to name just a few. As these factors differ across congressional races (and certainly the candidates themselves differ), outcomes of House elections may vary widely within the same state.

The Efficiency Gap statistic used by Professor Jackman increases as the number of seats won by a party increases. Of course, the more seats one party wins the more “wasted” votes appear on the other side of the ledger. Given the measure is a ratio of net wasted votes to total votes, perhaps this goes without saying. I do think this is an important point to emphasize, however, given the fact that this metric is related to the proportion of seats won. Figure 4 illustrates this point by plotting the Efficiency Gap measure in North Carolina from 1992 to 2016 against the percentage of congressional seats held by the GOP. In Figure 4 I have also plotted the least squares or best fit line from a corresponding OLS regression equation. Visually, one can see that the EG measure closely tracks the percentage of seats held. The OLS regression equation on which the best fit line is based indicates that the percentage of congressional seats held by the GOP is a statistically significant predictor of the Efficiency Gap. This single variable is able to explain 83% of the variance on the EG measure calculated for North Carolina.

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20Source: North Carolina State Board of Elections (www.ncsbe.gov/ncsbe/).
21In the American system a voter can split their ticket, voting for candidate of different parties for various races.
22OLS Equation:

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>S.E.</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-.7749</td>
<td>.1052</td>
<td>.001</td>
</tr>
<tr>
<td>% (R) Seats</td>
<td>.3927</td>
<td>.0604</td>
<td>.001</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$N$</td>
<td>13</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 4. Efficiency Gap Measure by Seats Held for North Carolina, 1992-2016
The Efficiency Gap under a Hypothetical Districting Scheme

This section investigates how the Efficiency Gap measure might interact with two hypothetical districting schemes. Imagine a jurisdiction containing ten single-member districts, each of which contain 6,000 voters. There are two political parties, Party A and Party B. The overall partisan division within the jurisdiction falls along the following lines. Twenty percent of the jurisdiction is comprised of a demographic that votes overwhelmingly for Party A (Group IA). Another 25% of the electorate (Group IB) is comprised of another demographic that also overwhelmingly supports Party A. Party B has equally staunch support from 25% of the electorate (Group II) and the remainder of the electorate (30%) is comprised of a set of independent swing voters (Group III).

Two plans are presented (Plans 1 and 2) which distribute these partisan groups differently across the ten legislative districts. These distributions are given in Table 5 below. Plan 1 distributes Group IA equally across six districts, while in Plan 2 this group is found in larger numbers in Districts 1 and 2. The remaining strength of this group in Plan 2 is spread out across six additional districts. Groups IA and II are spread out across districts in both Plans 1 and 2. Group III is also distributed across districts in both plans, although there are denser concentrations of this group in districts with fewer partisans from Groups IA and IB (Districts 7 to 10 in Plan 1 and 9 and 10 in Plan 2).

Table 5. Hypothetical Districting Plan with Distribution of Partisans

<table>
<thead>
<tr>
<th>District</th>
<th>IA</th>
<th>IB</th>
<th>II</th>
<th>III</th>
<th>District</th>
<th>IA</th>
<th>IB</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2,000</td>
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<td>2,000</td>
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<td>2</td>
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<td>1,000</td>
<td>1,250</td>
<td>1,250</td>
<td>2,500</td>
</tr>
<tr>
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<td>2,000</td>
<td>1,000</td>
<td>1,000</td>
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<td>5</td>
<td>1,000</td>
<td>1,250</td>
<td>1,250</td>
<td>2,500</td>
</tr>
<tr>
<td>6</td>
<td>2,000</td>
<td>1,000</td>
<td>1,000</td>
<td>2,000</td>
<td>6</td>
<td>1,000</td>
<td>1,250</td>
<td>1,250</td>
<td>2,500</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>1,500</td>
<td>1,500</td>
<td>3,000</td>
<td>7</td>
<td>1,000</td>
<td>1,250</td>
<td>1,250</td>
<td>2,500</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>1,500</td>
<td>1,500</td>
<td>3,000</td>
<td>8</td>
<td>1,000</td>
<td>1,250</td>
<td>1,250</td>
<td>2,500</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>1,500</td>
<td>1,500</td>
<td>3,000</td>
<td>9</td>
<td>0</td>
<td>1,500</td>
<td>1,500</td>
<td>3,000</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>1,500</td>
<td>1,500</td>
<td>3,000</td>
<td>10</td>
<td>0</td>
<td>1,500</td>
<td>1,500</td>
<td>3,000</td>
</tr>
<tr>
<td>Totals</td>
<td>12,000</td>
<td>12,000</td>
<td>12,000</td>
<td>24,000</td>
<td>Totals</td>
<td>12,000</td>
<td>12,000</td>
<td>12,000</td>
<td>24,000</td>
</tr>
</tbody>
</table>

In the following exercise I am going to vary the percentage of Group III casting votes for Party A and B. For simplicity, votes for the other groups (IA, IB, and II) will be held constant across

---

23I readily admit there are an infinite number of ways in which these the members of Groups IA, IB, II, and III could be apportioned across these ten districts. Plans 1 and 2 simply present two possibilities. Again, these hypothetical districting plans are designed to explore the reaction of the Efficiency Gap measure to different districting/election scenarios.
these permutations. Here I will make the assumption that these groups will vote as a bloc for their party’s candidate.  

With just 51% of the vote from Group III Party A controls all ten seats. A two-point movement on Group III’s vote to 51% for Party B produces a shift of four seats to Party B, leaving six for Party A. After this point, however, the redistricting plan is extremely stable, always producing a 6-seat to 4-seat advantage for Party A. This pattern would continue until Party B was able to claim 100% of Group III’s vote (at which point six races would be exactly tied). Again, if Group III’s vote ranges from 51% to 99% Party B would hold four seats.

Plan 2 exhibits more volatility depending on the distribution of the swing vote (Group III). With 51% of Group III’s vote going to Party A, Party A would capture all ten seats. A shift of 2% of Group III’s vote (51% for Party B) would allow Party B to win two seats. This pattern would remain stable until Party B was able to win 71% of Group III’s votes. At that point, Party B would capture eight seats, leaving Party A with only two. This pattern would then form a new equilibrium. Even if Party B captures 100% of Group III’s vote, Party A would still retain two seats. In summary, Plan 2 is characterized by a much higher degree of volatility, much more likely to be affected by the independent swing voters of Group III. Table 6 summarizes seat totals by plan based on the distribution of the independent swing voters.

<table>
<thead>
<tr>
<th>Group III Vote for Party B</th>
<th>Plan 1 Party A Seats</th>
<th>Plan 1 Party B Seats</th>
<th>Group III Vote for Party B</th>
<th>Plan 2 Party A Seats</th>
<th>Plan 2 Party B Seats</th>
</tr>
</thead>
<tbody>
<tr>
<td>49%</td>
<td>10</td>
<td>0</td>
<td>49%</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>51%</td>
<td>6</td>
<td>4</td>
<td>51%</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>55%</td>
<td>6</td>
<td>4</td>
<td>55%</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>60%</td>
<td>6</td>
<td>4</td>
<td>60%</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>65%</td>
<td>6</td>
<td>4</td>
<td>65%</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>71%</td>
<td>6</td>
<td>4</td>
<td>71%</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>75%</td>
<td>6</td>
<td>4</td>
<td>75%</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>80%</td>
<td>6</td>
<td>4</td>
<td>80%</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>85%</td>
<td>6</td>
<td>4</td>
<td>85%</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>90%</td>
<td>6</td>
<td>4</td>
<td>90%</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>95%</td>
<td>6</td>
<td>4</td>
<td>95%</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>99%</td>
<td>6</td>
<td>4</td>
<td>99%</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

Next, I will convert these hypothetical vote shares into the Efficiency Gap measure based on each of the two districting plans presented. These calculations are plotted in Figure 5. A black
rectangle denotes a range of +/- .08 on the Efficiency Gap measure. Scores falling within the box, therefore, would not be considered evidence of a partisan gerrymander as defined by Professor Jackman.²⁵ Again, for each plan the only thing that is allowed to vary is the percentage of the independent swing vote going to each party. The percentage of the swing vote is plotted across the horizontal axis in the figure. Looking at the line representing Efficiency Gap scores for Plan 1 there is a range where this plan would not be classified as a partisan gerrymander (EG values < +/- .08). Although the partisan seat distribution never changes when Party B receives at least 51% of Group III’s vote, the Efficiency Gap measure indicates that Plan 1 is sometimes a gerrymander and sometimes not—simply based on the share of the swing vote received by Party B. Looking at Plan 2 on the other hand, EG scores always fall outside of the +/- .08 limit. Regardless of the percentage of the swing vote going to Party B, Plan 2 would always be classified as a gerrymander. Again, Plan 1 is unchanging in terms of the partisan seat distribution across this range, as compared to the potential volatility noted with Plan 2.

Figure 5. Efficiency Gap Measure Performance-Hypothetical Districting Plans
Although hypothetical and highly simplified, these plans are designed to illustrate a point. They depict a rough representation of the North Carolina electorate. Plan 1 might have been more typical of a districting scheme used in the 1970s and 1980s prior to the creation of VRA districts. Plan 2, on the other hand, is more representative of a districting plan that might have been produced in a post-VRA environment in response to minority vote dilution. The point of this exercise has been to explore how the Efficiency Gap measure may respond to changing electoral circumstances (within these different districting plans). The results indicate, within the same districting scheme, the measure is not effective at detecting the presence of certain types of gerrymandering. The measure is also extremely sensitive to election outcomes and the distribution of votes across districts. These characteristics raise serious concerns about using the Efficiency Gap measure to detect the presence of a gerrymandered plan.

IV. THE 2016 CONGRESSIONAL REDISTRICTING

In this section I will demonstrate that the 2016 congressional districting plan in North Carolina followed traditional considerations in drawing legislative district boundaries. More specifically, I will examine the 2016 congressional plan on factors including population deviation, contiguity, incumbency protection, and district core retention. To place things in context I further provide a number of comparisons between the 2011 and 2016 congressional plans on compactness, maintaining communities of interest, and VTD splits.

Population Equalization
Table 7 below examines population deviation across the thirteen districts created by the 2016 plan. Equalizing population between congressional districts within a state is the most critical element of any redistricting plan. As shown in the table the 2016 congressional districting plan contains essentially no deviation from the ideal district population count of 733,499. In this regard the Contingent Congressional Plan can be labeled a zero deviation plan.

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26 Within these simple district frameworks, seat gains could most likely be expanded further by varying partisan vote distributions within districts. Map drawers could manipulate other types of differences as well. For example, the difference between total population and eligible voters in a district.

27 Data utilized in this section from the North Carolina General Assembly Redistricting Office and the Legislative Services Office.
<table>
<thead>
<tr>
<th>District</th>
<th>2010 Population</th>
<th>Percent Deviation from Ideal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>733,499</td>
<td>0.00%</td>
</tr>
<tr>
<td>2</td>
<td>733,499</td>
<td>0.00%</td>
</tr>
<tr>
<td>3</td>
<td>733,499</td>
<td>0.00%</td>
</tr>
<tr>
<td>4</td>
<td>733,499</td>
<td>0.00%</td>
</tr>
<tr>
<td>5</td>
<td>733,499</td>
<td>0.00%</td>
</tr>
<tr>
<td>6</td>
<td>733,499</td>
<td>0.00%</td>
</tr>
<tr>
<td>7</td>
<td>733,499</td>
<td>0.00%</td>
</tr>
<tr>
<td>8</td>
<td>733,499</td>
<td>0.00%</td>
</tr>
<tr>
<td>9</td>
<td>733,499</td>
<td>0.00%</td>
</tr>
<tr>
<td>10</td>
<td>733,499</td>
<td>0.00%</td>
</tr>
<tr>
<td>11</td>
<td>733,499</td>
<td>0.00%</td>
</tr>
<tr>
<td>12</td>
<td>733,499</td>
<td>0.00%</td>
</tr>
<tr>
<td>13</td>
<td>733,499</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

**Compactness and Contiguity**

The congressional districts from both the 2011 and 2016 plans all met the criteria of being contiguous. Table 8 below examines these districts based on two commonly used measures of compactness: Reock and Polsby-Popper. Across these two plans the average Reock scores increased from .30 to .36 and the Polsby-Popper score more than doubled (from .12 to .25). Using these two measures one can quickly conclude that the 2016 congressional plan is, on average, more compact that the plan that preceded it. More specifically, the General Assembly indicated in its adopted criteria that in response to the *Harris* decision the former 12th District would be reconfigured. As indicated below the 12th District as drawn in 2016 now possesses substantially higher compactness scores (from .07 to .44 on the Reock measure and from .03 to .27 on the Polsby-Popper measure).
Table 8. Compactness Comparison

<table>
<thead>
<tr>
<th>District</th>
<th>Reock 11</th>
<th>Polsby-Popper 11</th>
<th>Reock 16</th>
<th>Polsby-Popper 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.29</td>
<td>.04</td>
<td>.35</td>
<td>.20</td>
</tr>
<tr>
<td>2</td>
<td>.43</td>
<td>.11</td>
<td>.31</td>
<td>.15</td>
</tr>
<tr>
<td>3</td>
<td>.37</td>
<td>.10</td>
<td>.47</td>
<td>.37</td>
</tr>
<tr>
<td>4</td>
<td>.17</td>
<td>.05</td>
<td>.31</td>
<td>.19</td>
</tr>
<tr>
<td>5</td>
<td>.40</td>
<td>.16</td>
<td>.36</td>
<td>.33</td>
</tr>
<tr>
<td>6</td>
<td>.24</td>
<td>.12</td>
<td>.50</td>
<td>.32</td>
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<td>7</td>
<td>.41</td>
<td>.13</td>
<td>.47</td>
<td>.32</td>
</tr>
<tr>
<td>8</td>
<td>.35</td>
<td>.23</td>
<td>.25</td>
<td>.21</td>
</tr>
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<td>9</td>
<td>.17</td>
<td>.08</td>
<td>.23</td>
<td>.19</td>
</tr>
<tr>
<td>10</td>
<td>.34</td>
<td>.23</td>
<td>.35</td>
<td>.26</td>
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<tr>
<td>11</td>
<td>.26</td>
<td>.22</td>
<td>.26</td>
<td>.21</td>
</tr>
<tr>
<td>12</td>
<td>.07</td>
<td>.03</td>
<td>.44</td>
<td>.27</td>
</tr>
<tr>
<td>13</td>
<td>.38</td>
<td>.06</td>
<td>.36</td>
<td>.23</td>
</tr>
</tbody>
</table>

Mean .30 .12 .36 .25

**Incumbency**

Another stated goal of the criteria adopted by the General Assembly was to attempt to keep current congressional incumbents from being paired in the same district. In terms of achieving this goal, only two incumbents were paired in the 2016 congressional plan. The 2016 plan shifted District 13 further west across the state to a wholly new location. As a consequence Republican George Holding, formerly from District 13, was paired with Democrat David Price, formerly from District 4, in the new 4th District as drawn in 2016. In summary, 85% of congressional incumbents (11 of 13) were not paired in the 2016 plan.

In this same category I also examine district core retention levels from the 2011 plan to the 2016 plan. Table 9 details the percentage of percentage of the population in the 2016 congressional districts held over from the corresponding 2011 district. The presence of a district core is closely linked to incumbent electoral success and, as such, is an important element related to protecting incumbents across a redistricting cycle. Retaining a population core representative of an incumbent’s previous constituency helps to insulate the officeholder from political uncertainty that can accompany redistricting. On average, the 2016 congressional district retained three-fifths of its previous constituents. Stated differently, just over 60% of the post-redistricting voting age population for a given district had been part of the old district as configured in 2001. This finding is certainly part of a plan designed to protect incumbents. Again, the noted exception is District 13 which scores a zero on this metric as it was moved to a new geographic location within the state.

28Ellmers was defeated by Holding in the 2016 Republican Primary for the 2nd District. Holding’s old district (CD13) comprised 60.8% of the new 2nd District. The new 13th District did not contain an incumbent, making it an open seat in 2016.
Table 9. 2016 Congressional Districts-Core Retention

<table>
<thead>
<tr>
<th>District</th>
<th>District Core Retention</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>69.5%</td>
</tr>
<tr>
<td>2</td>
<td>56.6%</td>
</tr>
<tr>
<td>3</td>
<td>80.6%</td>
</tr>
<tr>
<td>4</td>
<td>62.1%</td>
</tr>
<tr>
<td>5</td>
<td>73.1%</td>
</tr>
<tr>
<td>6</td>
<td>50.0%</td>
</tr>
<tr>
<td>7</td>
<td>71.9%</td>
</tr>
<tr>
<td>8</td>
<td>42.4%</td>
</tr>
<tr>
<td>9</td>
<td>39.3%</td>
</tr>
<tr>
<td>10</td>
<td>95.6%</td>
</tr>
<tr>
<td>11</td>
<td>96.5%</td>
</tr>
<tr>
<td>12</td>
<td>52.1%</td>
</tr>
<tr>
<td>13</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Mean 60.8%

Communities of Interest
The next table examines a metric that falls under the heading of maintaining communities of interest. More specifically, Table 10 details the number of counties split across congressional districts. Attempting to minimize split counties in a plan has long been a recognized traditional redistricting principle. This goal was also highlighted in the adopted criteria under the heading **Compactness**. Table 10 also compares the 2011 congressional plan to the current plan enacted in 2016. On this metric only 13% of North Carolina’s counties were split across congressional districts in the 2016 plan, compared with 40% in the previous plan.\(^{29}\) This demonstrates a marked improvement in this measure. Of course, the present consideration does not override the dictate that population counts across congressional districts should be equal. Given the fact that a zero deviation plan was drawn with only thirteen split counties is quite a testament to the balancing act (among criteria) achieved by the current plan.

Table 10. Communities of Interest

<table>
<thead>
<tr>
<th></th>
<th>2011 Plan</th>
<th>2016 Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counties Split</td>
<td>40.0%</td>
<td>13.0%</td>
</tr>
<tr>
<td></td>
<td>[40]</td>
<td>[13]</td>
</tr>
<tr>
<td>Counties not Split</td>
<td>60.0%</td>
<td>87.0%</td>
</tr>
<tr>
<td></td>
<td>[60]</td>
<td>[87]</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

\(^{29}\)Also of note is the fact that in the 2011 plan seven counties were split three or more ways. In the 2016 plan, none of thirteen counties were split between more than two congressional districts.
**Voting Tabulation Districts**

Finally, I would like to compare the number of Voting Tabulation District (VTD) splits in the 2011 and 2016 plans. While not necessarily analogous to communities of interest, there has long been an acknowledgement among those drawing maps (legislatures) and those judging maps (courts) that not splitting VTDs/Precincts is desirable. Table 11 examines VTD splits present in the 2011 and 2016 congressional plans. Only 12 VTDs total, or 0.4%, were split across districts in the 2016 plan. Although most VTDs were fully intact in the 2011 plan (97.5%), the 2016 plan still demonstrates improvement in that this figure is now close to 100%.

Table 11. VTD Splits

<table>
<thead>
<tr>
<th></th>
<th>2011 Plan</th>
<th>2016 Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTDs Split</td>
<td>2.5%</td>
<td>0.4%</td>
</tr>
<tr>
<td></td>
<td>[68]</td>
<td>[12]</td>
</tr>
<tr>
<td>VTDs not Split</td>
<td>97.5%</td>
<td>99.6%</td>
</tr>
<tr>
<td></td>
<td>[2,624]</td>
<td>[2,680]</td>
</tr>
<tr>
<td>Total</td>
<td>2,692</td>
<td>2,692</td>
</tr>
</tbody>
</table>

**Summary**

The 2016 congressional plan exhibited zero percent population deviation across districts. All thirteen districts in the 2016 plan are contiguous. Compared to the previous plan (2011) the current districts show considerable improvement in terms of compactness. The current plan also demonstrates significant improvement over its predecessor in terms of maintaining communities of interest and keeping VTDs intact. Finally, the goal of incumbent protection outlined in the adopted criteria appears to have also been met with implementation of the current congressional plan. Most incumbents were not paired and the average core retention level was consistent with a plan designed to insulate incumbents. In conclusion, it is hard to argue that the 2016 congressional plan ignored traditional redistricting criteria or the criteria adopted by the General Assembly.

V. THE 2016 CONGRESSIONAL REDISTRICTING AND PARTISANSHIP

In this section I will examine the partisan composition of the thirteen congressional districts from the 2016 plan using the same partisan vote index previously described.30 The figures presented in the Table 12 below are Republican votes cast as a percentage of the total two-party vote cast by district. I categorize districts in the 2016 plan based on this GOP vote index. Districts below 45% Republican are considered safely Democratic. Districts ranging from 45% to 50% Republican are considered Democratic-leaning, but competitive, while districts in the 50% to 55% range are categorized as Republican-leaning, but competitive. Finally, any district above 55% Republican is denoted as being safely Republican.31 Using these calculations Districts 1, 4, and 12 are safe

30 Using GIS, I was able to assign VTDs, with vote information attached, into their proper congressional districts. From this I was able to re-aggregate the votes cast in these eleven races by congressional district and calculate a partisanship score for each district.

31 Classifying competitive seats in the +/-5% range is a conservative measure of competition. Some political scientists use an even more stringent definition classifying a race won by less than 60% of the total vote (+/-10%) as being a marginal victory and, as such, a very competitive contest (for example see Gary Jacobson. 1987. “The
Democratic seats. Districts 3, 5, 6, 10, and 11 can be classified as safe Republican seats.\textsuperscript{32} Finally, Districts 2, 7, 8, 9, and 13 are GOP-leaning, but still considered competitive. Some additional evidence of potential electoral competition is the fact that the average percentage of Democratic registrants for these districts stands at 42.5%, while the average percentage of Republican registrants is 34.3%.\textsuperscript{33} The raw material, at least, exists whereby Democrats can be electorally viable. The missing ingredient may be the nomination of more moderate Democratic candidates who may be able to attract the needed votes of both Democrats and Independents in order to secure electoral victory.

At present 23.1% of the current North Carolina congressional districts can be classified as safe Democratic, 38.5% are safe Republican, and 38.5% are Republican-leaning, but still competitive.

Table 12. Partisan Classification of North Carolina Congressional Districts, 2016

<table>
<thead>
<tr>
<th>District</th>
<th>Percent Republican</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>29.8%</td>
<td>Safe Democratic</td>
</tr>
<tr>
<td>2</td>
<td>54.4%</td>
<td>Republican, Competitive</td>
</tr>
<tr>
<td>3</td>
<td>56.3%</td>
<td>Safe Republican</td>
</tr>
<tr>
<td>4</td>
<td>35.1%</td>
<td>Safe Democratic</td>
</tr>
<tr>
<td>5</td>
<td>56.3%</td>
<td>Safe Republican</td>
</tr>
<tr>
<td>6</td>
<td>54.9%</td>
<td>Safe Republican</td>
</tr>
<tr>
<td>7</td>
<td>54.3%</td>
<td>Republican, Competitive</td>
</tr>
<tr>
<td>8</td>
<td>54.0%</td>
<td>Republican, Competitive</td>
</tr>
<tr>
<td>9</td>
<td>54.0%</td>
<td>Republican, Competitive</td>
</tr>
<tr>
<td>10</td>
<td>57.6%</td>
<td>Safe Republican</td>
</tr>
<tr>
<td>11</td>
<td>58.4%</td>
<td>Safe Republican</td>
</tr>
<tr>
<td>12</td>
<td>33.7%</td>
<td>Safe Democratic</td>
</tr>
<tr>
<td>13</td>
<td>53.5%</td>
<td>Republican, Competitive</td>
</tr>
</tbody>
</table>

\textbf{VI. CONCLUSION}

\textit{Implementation Issues}

What can be said concerning the Efficiency Gap measure and how it might actually be implemented to justify a partisan gerrymandering claim?\textsuperscript{34} Certainly an Efficiency Gap statistic can be calculated for a given plan.\textsuperscript{35} At what point, however, does this measure breach some

\textsuperscript{32}In terms of classification, the value for District 5, at 54.9% was rounded up to 55%.
\textsuperscript{33}Source: North Carolina General Assembly Redistricting Office (www.ncleg.net/representation/redistricting.aspx).
\textsuperscript{34}Just to be clear, I am not endorsing this specific measure or any discussed threshold level for this measure. In this section I am seeking to examine questions concerning real-life issues related to implementation were this measure to be adopted by the Court to detect unconstitutional partisan gerrymandering.
\textsuperscript{35}Of course, another practical issue raised when calculating the EG measure is what to do concerning uncontested elections. Uncontested elections result in missing data. Professor Jackman uses a statistical model spanning many states across many election cycles in order to produce estimates for uncontested contests. As an academic exercise
unacceptable limit? Again, Professor Jackman suggests a threshold of +/-0.08 for a state the size of North Carolina.\textsuperscript{36} One issue with using a specific threshold value from an Efficiency Gap measure concerns the fact that a plan has to be constructed and at least one election held under said plan in order to calculate this measure. Following the 2020 Census and prior to the 2022 elections the North Carolina General Assembly will need to redraw congressional district boundaries. Under the relief being sought by the plaintiffs would the General Assembly be forced to hold an election, calculate an EG score, and then draw new district boundaries if the suggested +/-0.08 threshold has been breached? In other words, if the Court were to accept this measure and its suggested threshold, there is no way that I can think of to prospectively evaluate a redistricting plan.\textsuperscript{37} Just from a practical standpoint this issue would appear to be a major hurdle in attempting to apply such a measure to real life circumstances. Along these same lines, would a plaintiff be able to challenge a districting plan within its life-cycle following any election found to breach the suggested threshold? The answers to these questions of implementation are quite foggy to say the least and cast some degree of doubt as to the actual utility of the EG measure.

**Concluding Thoughts**

North Carolina has undergone a dramatic political change over the last half-century. Once characterized by one-party politics the state is now decidedly two-party competitive. Of late, the Republican Party has made considerable officeholding gains and now controls the General Assembly. Having examined the congressional redistricting process it is apparent that the General Assembly followed traditional principles in drawing the 2016 map. As well, considerable improvements may be noted over the previous plan (2011) in a number of areas such as compactness and maintaining communities of interest. The state’s political geography would also seem to naturally favor Republicans in the creation of congressional districts. I have also demonstrated that redistricting is only one component in explaining outcomes in congressional races. The configuration of the 2016 congressional elections, with twelve of thirteen races featuring an incumbent, heavily favored maintenance of the status quo in terms of representation (even with the implementation of a new map).

The plaintiffs in this matter have claimed the Republican-controlled General Assembly in North Carolina has engineered an unconstitutional partisan gerrymandering scheme. Through this scheme they further allege Republicans have gained an indefensible number of the state’s congressional seats. The question of what constitutes an unconstitutional partisan gerrymander, in my opinion, is not resolved by running a set of hypothetical districting simulations or calculating an Efficiency Gap measure. At some level there is still a reversion back to the idea


\textsuperscript{37}One could attempt to prospectively calculate an EG measure for a plan prior to implementation (before an election is held under the plan). However, such calculations would be based on hypothetical election outcomes and hypothetical turnout rates. A prospective (hypothetical) EG value could certainly differ from an actual EG value calculated following an election. This prospect raises the very real question: Should a redistricting plan drawn, but not yet implemented, be judged unconstitutional if a prospective (hypothetical) EG value exceeds some threshold level? Additionally, the EG measure cannot be calculated “on the fly” within GIS mapping software, but would have to be calculated after a plan was fully completed, making the process all the more laborious.
that the seat distribution in a state should resemble the partisan vote distribution. Stated otherwise, there is the normative idea encapsulated within such exercises that votes and seats should be proportional to one another. Given the winner-take-all single member system of elections used to elect members of the House of Representatives, however, such an expectation is seldom born out.

Is the Efficiency Gap measure simply a mechanism whereby the normative goal of achieving proportionality in a single-member districting context can be achieved? From the evidence I have examined, things would appear to point in that direction.
VII. DECLARATION

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

Executed on April 3, 2017.

___________________________________
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Appendix: Data Sources

GIS Data Files
North Carolina General Assembly Redistricting Office
(http://www.ncleg.net/representation/redistricting.aspx).

2011 and 2016 Plan Data
North Carolina General Assembly Redistricting Office
(http://www.ncleg.net/representation/redistricting.aspx).
North Carolina General Assembly Legislative Services Office (through counsel).

North Carolina Election Data

Campaign Finance Statistics
Curriculum Vitae  
(April 2017)

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Academic Positions
University of Georgia  
Professor, 2013-present  
Director, SPIA Survey Research Center, 2016-present.
Director of Graduate Studies, 2011-2016.
Associate Professor, 2005-2013
Assistant Professor, 1999-2005.
Texas Tech University  
Visiting Assistant Professor, 1997-1999.

Education
Ph.D. Political Science  
Texas Tech University  
1997
M.A. Political Science  
Baylor University  
1993
B.S. Political Science  
Texas A&M University  
1991

Peer-Reviewed Books
(Quentin Kidd and Irwin L. Morris, co-authors).
[Softcover version in 2014 with new Epilogue]

Peer-Reviewed Publications


[Winner of the 2014 Hahn-Sigelman Prize]


**Invited Publications**

Book Chapters


[Reprint of 2004 *APR* article with Epilogue containing updated analysis and other original material.]


Other Publications


Grant-funded Research (UGA)


Curriculum Grants (UGA)

Dissertation
“Capturing Bubba's Heart and Mind: Group Consciousness and the Political Identification of Southern White Males, 1972-1994.”
Chair: Professor Sue Tolleson-Rinehart

Papers and Activities at Professional Meetings


“Black Mobilization and the Growth of Southern Republicanism: Two Sides of the Same Coin?”


Other Professional Presentations

“Much Adieu About Nothing?: An Empirical Assessment of Georgia’s Voter Identification Statute.” 2010. Presentation made to the Department of Political Science, Texas Tech University. Lubbock, TX.


**Areas of Teaching Competence**
- American Politics: Behavior and Institutions
- Public Policy
- Scope, Methods, Techniques

**Teaching Experience**
- University of Georgia, 1999-present.
  - Graduate Faculty, 2003-present.
  - Provisional Graduate Faculty, 2000-2003.
  - Distance Education Faculty, 2000-present.

  - Visiting Faculty, 1997-1999.
  - Graduate Faculty, 1998-1999.
  - Extended Studies Faculty, 1997-1999.

**Courses Taught:**
- Undergraduate:
  - American Government and Politics, American Government and Politics (Honors), Legislative Process, Introduction to Political Analysis, American Public Policy, Political Psychology, Advanced Simulations in American Politics (Honors), Southern Politics, Southern Politics (Honors)

- Graduate:
  - Election Administration and Related Issues (Election Sciences), Political Parties and Interest Groups, Legislative Process, Seminar in American Politics, Southern Politics; Publishing for Political Science

**Editorial Boards**
- *Social Science Quarterly*. Member. 2011-present.


**Institutional Service (University-Level)**
- University Program Review Committee, 2009-2011.
  - Chair, 2010-2011
  - Vice-Chair, 2009-2010.
Graduate Council, 2005-2008.
   Program Committee, 2005-2008.
   Chair, Program Committee, 2007-2008.


Search Committee for University Librarian and Associate Provost, 2014.