

REPLY REPORT OF JOWEI CHEN, Ph.D.

In response to my December 22, 2017 expert report in this case, Defendants' counsel submitted a January 31, 2018 rebuttal report authored by Dr. John Alford. This reply report addresses the issues raised by Dr. Alford's rebuttal report. I also point out several empirical findings from my original report that Dr. Alford did not dispute and did not discuss.

First, I explain how, contrary to the claims in the text of Dr. Alford's rebuttal report, the computer code and data files turned over in connection with his report reveal that Dr. Alford did not analyze any election results from the 2012 and 2016 state house elections in HD 105 and HD 111. Instead, Dr. Alford's own computer code and underlying data files reveal that he actually analyzed the 2012 and 2016 US Presidential election results in Gwinnett and Henry Counties.

Nor did Dr. Alford even attempt to analyze any election results from the 2014 state house elections in HD 105 and HD 111. Overall, then, Dr. Alford effectively failed to analyze any of the state house elections held in HD 105 and HD 111 during 2012, 2014, and 2016. This failure is significant because these six elections are the most probative elections when conducting racially polarized voting analysis of house election results in HD 105 and HD 111. Thus, the fact that Dr. Alford's computer code files reveal that he failed to analyze any of these six state house elections illustrates that Dr. Alford has not provided any evidence to directly dispute my Ecological Inference (EI) and Ecological Regression (ER) calculations for the 2012, 2014, and 2016 state house elections in HD 105 and HD 111, as reported in my original December 2017 expert report.

Second, I explain that in conducting his analyses of non-legislative elections (such as Sheriff, Coroner, and County Commission Chair contests), Dr. Alford's computer code reveals a fundamental and significant mistake that renders every one of his Ecological Inference and Ecological Regression calculations invalid for the purposes of evaluating racially polarized voting in HD 105 and HD 111. Specifically, Dr. Alford did not even attempt to account for split precincts that are divided across multiple house districts. Instead, in calculating the racial composition of HD 105 and HD 111 precincts, Dr. Alford simply treated all voters in split precincts as if they all resided within one of the two challenged districts. This mistake caused Dr. Alford to significantly miscalculate the racial composition of voters in multiple precincts, thus rendering his Ecological Inference and Ecological Regression calculations invalid.

Third, I present in this report my racially polarized voting analysis of the January 2018 special house election in HD 111, an election that occurred after I submitted my original December 22, 2017 expert report. The results from this analysis indicate that voters in HD 111 continued to exhibit substantially the same level of racially polarized voting as they had in previous elections in the district.

Fourth, I address Dr. Alford's claim in his rebuttal report that voters respond to the partisanship of a candidate, not to the race of the candidate. I explain that this claim is irrelevant to the racially polarized voting analysis in my original expert report.

Fifth, I address Dr. Alford's claim in his rebuttal report that when combined together, the portions of split precincts outside of HD 105 and HD 111 are not very different in their aggregate racial composition from the portions of these precincts inside of the two challenged districts.

Finally, in this report, I note several empirical findings from my original December 22, 2017 expert report that were neither addressed nor disputed by Dr. Alford's rebuttal report.

1. Dr. Alford Failed to Analyze Any State House Elections from 2012, 2014, or 2016

In Tables 1 and 2 of his rebuttal report (p. 7), Dr. Alford purports to present his Ecological Inference and Ecological Regression analysis of several state and local election contests within HD 105 and HD 111 during November 2012 and November 2016. In particular, Dr. Alford purports to have analyzed the 2012 and 2016 state house elections, as well as other non-legislative contests, in HD 105 and HD 111. In connection with his report, Dr. Alford also turned over his computer code (Stata .do files and .R code files) and data files (.dta and .xlsx files) used to create the results in Tables 1 and 2 of his report.

Examination of Dr. Alford's computer code and data files reveals that Dr. Alford did not analyze election results from the HD 105 and HD 111 state house elections in 2012 and 2016. Instead, Dr. Alford's computer code and data files reveal that he analyzed the results of the 2012 US Presidential election contests. Although the text of Dr. Alford's rebuttal report states that he intended to analyze the 2012 and 2016 state house election results, his computer code files illustrate clearly that he did not analyze these state house elections. Below, I provide a complete listing of every computer code file in which Dr. Alford performed EI and ER calculations, and I detail the actual election contests each computer code file analyzed.

For both HD 105 and HD 111, the number of computer code files turned over by Dr. Alford perfectly matches the number of 2012 and 2016 election contests for which he reported EI and ER results in Tables 1 and 2. Therefore, it is apparent that Dr. Alford turned over the complete set of all computer code files he used to produce the EI and ER calculations in his rebuttal report. However, Dr. Alford labeled the elections incorrectly in Tables 1 and 2. I explain these mistakes below, and I identify below the actual election analyzed by each one of Dr. Alford's computer code files.

Dr. Alford's 2012 Election Results for HD 105: In rows 2-4 of Table 1 of his rebuttal report (p. 7), Dr. Alford lists three 2012 elections for which he claims to have analyzed voting behavior in HD 105: The 2012 state house election for HD 105, the Public Service Commission (District 3) election, and the Clerk of Superior Court election.

However, Dr. Alford's computer code and data files indicate that he did not analyze the HD 105 state house election results, although he did analyze the results from the Public Service Commission and Clerk of Superior Court elections. Specifically, the following computer code files reveal that Dr. Alford actually analyzed the three election contests listed below, with precinct-level election results imported from the data files listed below:

1) Dr. Alford's computer code file titled "elec2012_HD105_contest_1.do" (reprinted in Appendix F of this report) imports and analyzes precinct-level election results from the 2012 US Presidential election between Barack Obama, Mitt Romney, and Gary Johnson. Dr. Alford's computer code imports these results from a data file called "HD 105/Rdata_2012_contest_1.dta" (reprinted in Appendix E of this report) and attempts to conduct EI and ER calculations using the data in this file. I visually inspected the precinct-level election data contained in this data file and verified that they perfectly match the Gwinnett County precinct-level results of the Obama-Romney 2012 US Presidential election, as reported on the Georgia Secretary of State website.¹ Furthermore, another data file turned over by Dr. Alford in connection with his rebuttal report, called "HD 105/controlfile_2012_processed.dta" (reprinted in Appendix A of this report), clearly states that Dr. Alford's computer code was analyzing the results from the 2012 US Presidential election, not a state house election.

¹ Downloaded from: http://results.enr.clarityelections.com/GA/Gwinnett/42345/112372/en/md_data.html?cid=5&

2) Dr. Alford's computer code file titled "elec2012_HD105_contest_2.do" (reprinted in Appendix G of this report) imports and analyzes precinct-level election results from the 2012 Public Service Commission - District 3 election between Stephen Oppenheimer and Chuck Eaton. Dr. Alford's computer code imports these election results from a data file called "HD 105/Rdata_2012_contest_2.dta" and attempts to conduct EI and ER calculations using the data in this file.

3) Dr. Alford's computer code file titled "elec2012_HD105_contest_3.do" (reprinted in Appendix H of this report) imports and analyzes precinct-level election results from the 2012 Clerk of Superior Court election between Richard Alexander and Brian Whiteside. Dr. Alford's computer code imports these election results from a data file called "HD 105/Rdata_2012_contest_3.dta" and attempts to conduct EI and ER calculations using the data in this file.

I executed these three aforementioned computer code files on my own computer, and I found that these files indeed produce numerical results close to the ones reported in the upper half of Dr. Alford's Table 1 in his rebuttal report. However, Dr. Alford labeled the first election contest he analyzed in Table 1 incorrectly. Dr. Alford incorrectly labeled the second row of Table 1 if he had analyzed the November 2012 state house election in HD 105. As detailed above, Dr. Alford's computer code and data files reveal that he did not analyze the November 2012 HD 105 state house election. Instead, he analyzed the results of the November 2012 US Presidential election in Gwinnett County.

Dr. Alford's 2016 Election Results for HD 105: Dr. Alford made the same mistake in describing his 2016 election results for HD 105. In rows 7-9 of Table 1 of his rebuttal report (p. 7), Dr. Alford lists three 2016 elections for which he claims to have analyzed voting behavior in HD 105: The 2016 state legislative election for HD 105, the US Senator election, and the County Commission Chair election.

However, Dr. Alford's computer code and data files reveal that once again, he did not analyze the HD 105 state house election results, although he did analyze the results of the other two elections. Specifically, the following computer code files reveal that Dr. Alford actually analyzed the three election contests listed below, with precinct-level election results imported from the data files listed below:

1) Dr. Alford's computer code file titled "elec2016_HD105_contest_2.do" imports and analyzes precinct-level election results from the 2016 US Presidential election between Donald Trump and Hillary Clinton. Dr. Alford's computer code imports these results from a data file called "HD 105/Rdata_2016_contest_2.dta" and attempts to conduct EI and ER calculations using the data in this file. I visually inspected the precinct-level election data contained in this data file and verified that they perfectly match the Gwinnett County precinct-level results of the Trump-Clinton 2016 US Presidential election, as reported on the Georgia Secretary of State website.² Furthermore, another data file turned over by Dr. Alford in connection with his rebuttal report, called "HD 105/controlfile_2016_processed.dta" (reprinted in Appendix B of this report), clearly states that Dr. Alford's computer code was analyzing the results from the 2016 US Presidential election, not a state house election.

2) Dr. Alford's computer code file titled "elec2016_HD105_contest_1.do" imports and analyzes precinct-level election results from the 2016 US Senator election. Dr. Alford's computer code imports these election results from a data file called "HD 105/Rdata_2016_contest_1.dta" and attempts to conduct EI and ER calculations using the data in this file.

3) Dr. Alford's computer code file titled "elec2016_HD105_contest_3.do" imports and analyzes precinct-level election results from the 2016 County Commission Chair election. Dr. Alford's computer code imports these election results from a data file called "HD 105/Rdata_2016_contest_3.dta" and attempts to conduct EI and ER calculations using the data in this file.

I executed these three aforementioned computer code files on my own computer, and I found that these files indeed produce numerical results close to the ones reported in the lower half of Dr. Alford's Table 1 in his rebuttal report. However, Dr. Alford labeled the first of the 2016 election contests he analyzed in Table 1 incorrectly. Dr. Alford incorrectly labeled the seventh row of Table 1 as if he had analyzed the November 2016 state house election in HD 105. As detailed above, Dr. Alford's computer code and data files reveal that he did not analyze the November 2016 HD 105 state house election. Instead, he analyzed the results of the November 2016 US Presidential election in Gwinnett County.

² Downloaded from: http://results.enr.clarityelections.com/GA/63991/184321/en/md_data.html?cid=5000&

Dr. Alford's 2012 Election Results for HD 111: Dr. Alford made the same mistake in describing his 2012 election results for HD 111. In rows 2-5 of Table 1 of his rebuttal report (p. 7), Dr. Alford lists four 2012 elections for which he claims to have analyzed voting behavior in HD 111: The 2012 state house election for HD 111, the Public Service Commission-District 3 election, the Flint Circuit District Attorney election, and the County Commission Chair election.

However, Dr. Alford's computer code and data files indicate that once again, he did not analyze the HD 111 state house election results, although he did analyze the results from the other three elections. Specifically, the following computer code files reveal that Dr. Alford actually analyzed the four election contests listed below, with precinct-level election results imported from the data files listed below:

1) Dr. Alford's computer code file titled "elec2012_HD111_contest_1.do" imports and analyzes precinct-level election results from the 2012 US Presidential election between Barack Obama, Mitt Romney, and Gary Johnson. Dr. Alford's computer code imports these results from a data file called "HD 111/Rdata_2016_contest_1.dta" and attempts to conduct EI and ER calculations using the data in this file. I visually inspected the precinct-level election data contained in this data file and verified that they perfectly match the Henry County precinct-level results of the Obama-Romney 2012 US Presidential election, as reported on the Georgia Secretary of State website.³ Furthermore, another data file turned over by Dr. Alford in connection with his rebuttal report, called "HD 111/controlfile_2012_processed.dta" (reprinted in Appendix C of this report), clearly states that Dr. Alford's computer code was analyzing the results from the 2012 US Presidential election, not a state house election.

2) Dr. Alford's computer code file titled "elec2012_HD111_contest_2.do" imports and analyzes precinct-level election results from the 2012 Public Service Commission-District 3 election. Dr. Alford's computer code imports these election results from a data file called "HD 111/Rdata_2012_contest_2.dta" and attempts to conduct EI and ER calculations using the data in this file.

3) Dr. Alford's computer code file titled "elec2012_HD111_contest_3.do" imports and analyzes precinct-level election results from the 2012 Flint Circuit District Attorney election. Dr. Alford's computer code imports these election results from a data file called

³ Downloaded from: http://results.enr.clarityelections.com/GA/Henry/42353/112380/en/md_data.html?cid=5&

"HD 111/Rdata_2012_contest_3.dta" and attempts to conduct EI and ER calculations using the data in this file.

4) Dr. Alford's computer code file titled "elec2012_HD111_contest_4.do" imports and analyzes precinct-level election results from the 2012 County Commission Chair election. Dr. Alford's computer code imports these election results from a data file called "HD 111/Rdata_2012_contest_4.dta" and attempts to conduct EI and ER calculations using the data in this file.

I executed these four aforementioned computer code files on my own computer, and I found that these files indeed produce numerical results reasonably close to the ones reported in the upper half of Dr. Alford's Table 2 in his rebuttal report (p. 7). However, Dr. Alford labeled the first of the 2012 election contests he analyzed in Table 2 incorrectly. Dr. Alford incorrectly labeled the second row of Table 2 as if he had analyzed the November 2012 state house election in HD 111. As detailed above, Dr. Alford's computer code and data files reveal that he did not analyze the November 2012 HD 111 state house election. Instead, he analyzed the results of the November 2012 US Presidential election in Henry County.

Dr. Alford's 2016 Election Results for HD 111: Dr. Alford made the same mistake in describing his 2016 election results for HD 111. In rows 8-13 of Table 2 of his rebuttal report (p. 7), Dr. Alford lists six 2016 elections for which he claims to have analyzed voting behavior in HD 105: The 2016 state house election for HD 111, the US Senator election, the Clerk of Superior Court election, the Sheriff election, the Coroner election, and the County Commission Chair election.

However, Dr. Alford's computer code and data files indicate that once again, he did not analyze the HD 111 state house election results, although he did analyze the results from the other five elections. Specifically, the following computer code files reveal that Dr. Alford actually analyzed the six election contests listed below, with precinct-level election results imported from the data files listed below:

1) Dr. Alford's computer code file titled "elec2016_HD111_contest_1.do" imports and analyzes precinct-level election results from the 2016 US Presidential election between Donald Trump and Hillary Clinton. Dr. Alford's computer code imports these election results from a data file called "HD 111/Rdata_2016_contest_1.dta" and attempts to conduct EI and ER calculations

using the data in this file. I visually inspected the precinct-level election data contained in this data file and verified that they perfectly match the Henry County precinct-level results of the Trump-Clinton 2016 US Presidential election, as reported on the Georgia Secretary of State website.⁴ Furthermore, another data file turned over by Dr. Alford in connection with his rebuttal report, called "HD 111/controlfile_2016_processed.dta" (reprinted in Appendix D of this report), clearly states that Dr. Alford's computer code was analyzing the results from the 2016 US Presidential election, not a state house election.

2) Dr. Alford's computer code file titled "elec2016_HD111_contest_2.do" imports and analyzes precinct-level election results from the 2016 US Senator election. Dr. Alford's computer code imports these election results from a data file called "HD 111/Rdata_2016_contest_2.dta" and attempts to conduct EI and ER calculations using the data in this file.

3) Dr. Alford's computer code file titled "elec2016_HD111_contest_3.do" imports and analyzes precinct-level election results from the 2016 Clerk of Superior Court election. Dr. Alford's computer code imports these election results from a data file called "HD 111/Rdata_2016_contest_3.dta" and attempts to conduct EI and ER calculations using the data in this file.

4) Dr. Alford's computer code file titled "elec2016_HD111_contest_4.do" imports and analyzes precinct-level election results from the 2016 Sheriff election. Dr. Alford's computer code imports these election results from a data file called "HD 111/Rdata_2016_contest_4.dta" and attempts to conduct EI and ER calculations using the data in this file.

5) Dr. Alford's computer code file titled "elec2016_HD111_contest_5.do" imports and analyzes precinct-level election results from the 2016 Coroner election. Dr. Alford's computer code imports these election results from a data file called "HD 111/Rdata_2016_contest_5.dta" and attempts to conduct EI and ER calculations using the data in this file.

6) Dr. Alford's computer code file titled "elec2016_HD105_contest_6.do" imports and analyzes precinct-level election results from the 2016 County Commission Chair election. Dr. Alford's computer code imports these election results from a data file called "HD 105/Rdata_2016_contest_6.dta" and attempts to conduct EI and ER calculations using the data in this file.

⁴ Downloaded from: http://results.enr.clarityelections.com/GA/Henry/64067/183247/en/md_data.html?cid=5&

I executed these six aforementioned computer code files on my own computer, and I found that these files indeed produce numerical results close to the ones reported in the lower half of Dr. Alford's Table 2 in his rebuttal report. However, Dr. Alford labeled the first of the 2016 election contests he analyzed in Table 2 incorrectly. Dr. Alford incorrectly labeled the eighth row of Table 2 as if he had analyzed the November 2016 state house election in HD 111. As detailed above, Dr. Alford's computer code and data files reveal that he did not analyze the November 2016 HD 111 state house election. Instead, he analyzed the results of the November 2016 US Presidential election in Henry County.

In addition to the failure of Dr. Alford's computer code to actually analyze any election results from the 2012 and 2016 state house elections, Dr. Alford did not even claim to analyze any election results from the 2014 state house elections in HD 105 and HD 111. Overall, then, Dr. Alford effectively failed to analyze any of the state house elections held in HD 105 and HD 111 during 2012, 2014, and 2016. This failure is significant because these six elections are the most probative elections for the purpose of conducting racially polarized voting analysis of house election results in HD 105 and HD 111. These six elections are the most probative because: 1) These are the actual election contests held to elect state house representatives for the two challenged districts; and 2) These are the most recent election contests held during a regular November election.

Thus, the fact that Dr. Alford's computer code files reveal that he failed to analyze any of these six state house elections illustrates that Dr. Alford has not provided any evidence to directly dispute my Ecological Inference and Ecological Regression calculations for the 2012, 2014, and 2016 state house elections in HD 105 and HD 111, as reported in my original expert report of December 22, 2017.

2) Dr. Alford Failed to Account for Voters in Split Precincts in HD 105 and HD 111

For every election analyzed in Tables 1 and 2 of his rebuttal report (p. 7), Dr. Alford used incorrect data on the racial breakdown of voters within HD 105 and HD 111 because he failed to account for split precincts within the two districts. In the 2015 Plan, HD 105 splits three precincts out of ten total precincts covering the district, while HD 111 splits five precincts out of 13 total precincts covering the district. Similarly, in the 2012 Plan, HD 105 splits three precincts out of ten total precincts covering the district, while HD 111 splits 2 precincts out of 11 total

precincts covering the district. Because such a significant percentage of the precincts covering HD 105 and HD 111 are split, one must carefully determine which voters within each precinct reside within and outside of the borders of HD 105 and HD 111. Failing to account for district borders within each split precinct would lead to significantly inaccurate data regarding the racial composition of voters within precincts and within each district.

I explained and illustrated in my original expert report how correctly accounting for split precincts is a simple and straightforward task for political scientists using voter registration files and turnout history files. Yet Dr. Alford failed to account for the split precincts covering HD 105 and HD 111, and he did not rely upon a Georgia voter registration file and turnout history file, which would have allowed him to easily calculate the racial composition of voters within each district's portion of each split precinct. Instead, in each one of his computer code files performing EI and ER analyses (e.g., "elec2012_HD105_contest_1.do", which is reprinted in Appendix F), Dr. Alford simply used data on the racial composition of all voters within each precinct, regardless of whether these voters resided within or outside of HD 105 and HD 111. In producing his Table 1 and 2 results, Dr. Alford incorrectly analyzed all voters within all precincts that contain any portion of HD 105 and HD 111, without sorting out which voters actually resided within the boundaries of the two challenged districts.

Dr. Alford made this same mistake in every single one of his computer code files analyzing various election contests from the 2012 and 2016 elections. Dr. Alford's computer code failed to account for split precincts and thus used incorrect voter race counts in all sixteen of his computer code files analyzing these 2012 and 2016 elections.⁵

Perhaps in response to this data problem, each one of these sixteen computer code files - e.g., "elec2012_HD105_contest_1.do" (reprinted in Appendix F) - acknowledges that Dr. Alford's data contain mismatches between the number of voters who turned out within some precincts and the number of ballots actually cast in various election contests within those same precincts. To address these mismatches, lines 77-78 of Dr. Alford's computer code file titled "elec2012_HD105_contest_1.do" alters Dr. Alford's voter count numbers using an adjustment

⁵ The complete list of Dr. Alford's computer code files containing this mistake is as follows: "elec2012_HD105_contest_1.do", "elec2012_HD105_contest_2.do", "elec2012_HD105_contest_3.do", "elec2016_HD105_contest_1.do", "elec2016_HD105_contest_2.do", "elec2016_HD105_contest_3.do", "elec2012_HD111_contest_1.do", "elec2012_HD111_contest_2.do", "elec2012_HD111_contest_3.do", "elec2012_HD111_contest_4.do", "elec2016_HD111_contest_1.do", "elec2016_HD111_contest_2.do", "elec2016_HD111_contest_3.do", "elec2016_HD111_contest_4.do", "elec2016_HD111_contest_5.do", "elec2016_HD111_contest_6.do"

that Dr. Alford describes as follows: "so few precincts I cant afford to drop but have to allocate the the [sic] cast vote so give it to others based on proportionality" (see Appendix F, lines 77-78). Specifically, this line of Dr. Alford's computer code appears to adjust the number of non-Black voters within each precinct so as to artificially force the voter counts to match the ballots counts from the election data being analyzed. Every single one of these sixteen computer code files mentioned in Footnote 5 makes a similar artificial numerical adjustment to the precinct-level racial data prior to conducting Dr. Alford's EI and ER analysis.

At this point, it is apparent that Dr. Alford's computer code is not relying upon the actual number of Black and non-Black voters residing within the actual boundaries of HD 105 and HD 111. Instead, Dr. Alford appears to be using data that were adjusted or transformed and were not based on any attempt to account for the actual district boundaries of HD 105 and HD 111 within split precincts. Hence, it is clear that Dr. Alford's 2012 and 2016 election results in Tables 1 and 2 are not analyzing data on the actual voters within HD 105 and HD 111. Thus, Dr. Alford's EI and ER analyses reported in these Tables are invalid because the racial numbers used for these analyses are not describing the actual set of voters within the two districts.

To examine the magnitude and substantive impact of Dr. Alford's data accuracy problems, I examined how Dr. Alford's precinct-level racial voter counts differed from my counts, which were based only on the voters actually residing within the geographic boundaries of HD 105 and HD 111, with no numerical alterations like the ones performed by Dr. Alford's computer code. I found that Dr. Alford's racial voter counts were substantially inaccurate in multiple precincts:

For example, Henry County's Precinct 38 ("Hickory Flat") is split between HD 111 and HD 109 in the 2015 House Plan. The portion of this split precinct within HD 111 contained 795 Black and 583 non-Black voters who participated in the November 2016 election, so Blacks comprised 57.7% of the electorate within the HD 111 portion of Hickory Flat, as detailed in Table 16 of my original expert report (p. 37).

But Dr. Alford's computer code failed to account for the split portions of this precinct, in addition to the other adjustments Dr. Alford made to the racial data, as described earlier. As a result, Dr. Alford's racially polarized voting analysis for all 2016 elections used his inaccurate data, which claimed that HD 111 contained 1,495 Black and 1,768 non-Black voters in Precinct 38 ("Hickory Flat") in November 2016, implying that Blacks comprised only 45.8% of total

voters (far below the reality of 57.7%). Thus, Dr. Alford's inaccurate data led him to significantly miscalculate both the number of voters, as well as the Black share of voters within this Precinct residing within HD 111.

Dr. Alford produced similarly faulty data for Henry County's Precinct 61 ("McDonough Central"), which is also split between HD 111 and HD 109 in the 2015 House Plan. In reality, the portion of this split precinct within HD 111 contained 302 Black and 759 non-Black voters who participated in the November 2016 election, so Blacks comprised 28.5% of the electorate within the HD 111 portion of the McDonough Central precinct, as detailed in Table 16 of my original expert report (p. 37). But Dr. Alford's racially polarized voting analysis for 2016 elections used his inaccurate data, which claimed that HD 111 contained 949 Black and 1,528 non-Black voters in Precinct 61 ("McDonough Central"), implying that Blacks comprised 38.3% of total November 2016 voters (far above the reality of 28.5%). Once again, Dr. Alford's inaccurate data thus led him to significantly miscalculate both the number of voters, as well as the Black share of voters within this Precinct residing within HD 111. Altogether, data inaccuracies such as these are sufficiently substantial to have caused Dr. Alford to reach faulty and invalid estimates in his racially polarized voting analyses.

3) Racially Polarized Voting Analysis of the January 2018 HD 111 Special Election

In this section, I present a racially polarized voting analysis of the January 2018 special house election in HD 111, an election that occurred after I submitted my original December 22, 2017 expert report. The results from this analysis indicate that voters in HD 111 continued to exhibit substantially the same level of racially polarized voting as they had in previous elections in the district.

I conducted this racially polarized voting analysis in exactly the same way as in my original expert report: I first calculated precinct-level racial breakdowns of the turnout electorate – the set of registered voters who cast ballots – within the boundaries of HD 111 during the January 2018 special election. I then compared these precinct-level racial breakdowns to the precinct-level partisan results for HD 111 in this special house election. I calculated both Ecological Inference and Ecological Regression estimates, and Table 1 presents both sets of results.

Table 1:
Ecological Inference and Ecological Regression Estimates of Democratic Candidates' Share of Two-Party Vote Among Blacks and Non-Blacks in House District 111

	Ecological Inference Estimates		Ecological Regression Estimates:	
	Black	Non-Black	Black	Non-Black
January 2018 Special Election, House District 111	98.7% [97.1%, 99.5%]	14.2% [13.8%, 15.1%]	100% [100%, 100%]	4.3% [1.8%, 6.7%]

[95% Confidence Intervals listed in brackets]

Table 1 illustrates that in the January 2018 special election, voters in HD 111 continued to exhibit significantly racially polarized voting, just as they had in state house elections during 2012, 2014, and 2016. In the January 2018 special election, approximately 98.7% of Black voters supported one of the two Democratic candidates, whereas only 14.2% of non-Black voters supported one of the Democratic candidates. These voting patterns are evidence of very significant racially polarized voting, and these patterns indicate a continuation of the same racially polarized voting patterns described in my original expert report in state house elections during 2012, 2014, and 2016.

In his rebuttal report, Dr. Alford also presented an EI and ER analysis of the January 2018 special house election for HD 111, as reported in the bottom row of Table 2 of his rebuttal report. Dr. Alford's ER estimates are almost identical to mine, but his EI estimates were slightly different: Dr. Alford reported that 89.1% of Black voters and 18.8% of non-Black preferred a Democratic candidate.

Although Dr. Alford's estimates substantially confirm my conclusion that there was strong racially polarized voting in the January 2018 special election, I nevertheless examined Dr. Alford's computer code and underlying data files to understand why he reached slightly different estimates. Examination of his underlying precinct-level data files (named: "datafor2018spechd111_4cand.dta" and "datafor2018spechd111_2cand.dta") immediately revealed that once again, Dr. Alford's analysis suffered from one of the same data inaccuracy problems that plagued his earlier calculations described above.

Specifically, it is apparent from these two precinct-level data files that once again, just as he did in the "elec2012_HD105_contest_1.do" computer code described earlier, Dr. Alford made

his own set of numerical adjustments to the number of non-Black voters in each precinct in HD 111, as reported in these data files in the column named "allothturn". The result of Dr. Alford's adjustment of the non-Black voter counts is that when he conducted his Ecological Inference calculations using a computer code file titled "bo_4candSE.r", his calculations were based upon artificially modified data on the number of non-Black voters within each precinct in HD 111.

Among the data files that Dr. Alford turned over was an Excel file titled "data for 2018 spec hd111.xlsx", which correctly lists the actual number of black and non-Black voters that participated in the January 2018 election within each precinct, as reported by the Georgia Secretary of State. However, Dr. Alford's Ecological Inference calculations did not use these official non-Black voter counts. Instead, Dr. Alford used his modified count of non-Black voters. Regardless of Dr. Alford's motivations for making these numerical adjustments to the racial data, it is clear from Dr. Alford's computer code that his analysis of the January 2018 special election was based on data that did not accurately describe the actual racial composition of voters who participated in the election. This use of inaccurate data helps explain why Dr. Alford arrived at Ecological Inference estimates slightly different from my EI estimates described in Table 1.

4) Racially Polarized Voting Analysis and the Racial Identity of Candidates

In my original December 22, 2017 report, I conducted a racially polarized voting (RPV) analysis of black and non-black voters in state legislative election contests in HD 105 and HD 111 during November 2012, 2014, and 2016. The standard approach taken by political scientists when analyzing RPV in election contests such as these involves asking two questions: 1) Whether Black voters usually vote for the same candidates in legislative races; and 2) Whether non-Black voters exhibit sufficient bloc voting to defeat candidates supported by Black voters. In my original report, I found that in both HD 105 and HD 111, 98–99% Black voters support the Democratic state legislative candidate in each election. Meanwhile, 75–85% of non-Black voters support Republican candidates, constituting a level of bloc voting sufficient to defeat the Democratic candidate supported by Black voters.

In response, Dr. Alford's rebuttal report attempts to argue that "voters are responding to the party of the candidate, and not the race of the candidate." Dr. Alford states that Black voters support both white and Black Democratic candidates, whereas white voters largely oppose both white and Black Democratic candidates.

These claims by Dr. Alford are irrelevant to the empirical analysis in my original report. I simply sought to analyze whether Black voters generally support the same candidate in a legislative contest and whether non-Black voters generally oppose the candidate preferred by Black voters. Answering these two questions did not require me to analyze the effect of the candidate's racial identity on Black or non-Black voter behavior. Therefore, Dr. Alford's claims are irrelevant to the racially polarized voting analysis in my original report.

Moreover, in this case, the Legislature's primary map-drawer, Ms. Gina Wright, testified in her November 2017 deposition that the 2015 Plan was drawn to enhance the likelihood that Republican house candidates would defeat Democratic candidates (pp. 22, 24-26, 28-29). Given this admission of partisan intent, in the context of this case, the key issue I sought to analyze is whether Black voters generally support Democratic or Republican candidates and whether non-black voters oppose the Black-preferred candidate, not the race of the candidates. Indeed, the Democratic candidate for the November 2014 HD 111 house election was Caucasian, and this house election exhibited substantially the same level of racially polarized voting as the other two HD 111 house elections I analyzed in my original expert report.

5) The Predominance of Race in the Splitting of Precincts

On pages 8-9 of his rebuttal report, Dr. Alford argues that the 2015 Plan does not split precincts in HD 105 and HD 111 on the basis of race. Dr. Alford's evidence for this argument is his observation that the portions of the split precincts inside of HD 105 and HD 111 are not extremely different in their *aggregate* racial composition from the portions of the split precincts outside these two districts.

Dr. Alford's observation about the *aggregate* racial composition of these split precinct portions is irrelevant, and Dr. Alford's misunderstands how a district's split precincts are properly analyzed:

First, the fact that virtually all Black voters in HD 105 and HD 111 support Democratic candidates, while the vast majority of non-Blacks oppose Democratic candidates, implies that a voter's race is a statistically strong proxy for partisanship. Therefore, changing the racial composition of a district by even only a small amount can guarantee a noticeable change in the partisan performance of the district.

Second, the “2011-2012 Guidelines for the House Legislative and Congressional Reapportionment Committee” (Hereinafter: “Redistricting Guidelines”) require that districts follow precinct boundaries. The fact that HD 105 and HD 111 in 2015 Plan split a total of eight precincts constitutes a significant violation this traditional districting principle. Thus, as none of these eight split precincts was compelled by the Redistricting Guidelines, it is important to scrutinize how the choice of splitting each individual precinct was made by the Reapportionment Office.

Third, the Legislature's primary map-drawer, Ms. Gina Wright, testified in her November 20, 2017 deposition that in producing the 2015 Plan, the Legislative and Congressional Reapportionment Office analyzed no partisan data at any lower level of geography than the precinct level; instead, the Reapportionment Office simply assumed that all census block within any single precinct contain the same proportion of Republican and Democratic voters (pp. 111-113). In his December 18, 2017 deposition, Mr. Robert Strangia, a GIS specialist at the Reapportionment Office, confirmed Ms. Wright’s statement regarding this assumption. Mr. Strangia’s deposition testimony confirmed that the Reapportionment Office did not possess any data allowing it to distinguish different census blocks within the same precinct with respect to their relative partisan balance. Instead, according to Mr. Strangia, the Reapportionment Office simply assumed that all census blocks within the same precinct contain the same proportion of Republican and Democratic voters (pp. 24-27).

Therefore, the Reapportionment Office could not possibly have used partisan data in deciding how to split any individual precinct into two different districts. Instead, the Reapportionment Office only had access to census block-level data, including population and racial data, in deciding how to split any individual precinct.

Fourth, because the Reapportionment Office had only racial data at the sub-precinct level, rather than any meaningful partisan data allowing it to distinguish among different blocks within a precinct, and because the Redistricting Guidelines do not call for any precincts to be split, each of the eight precincts split by the 2015 Plan should be analyzed individually. The Reapportionment Office was not required to split apart any particular set of precincts; therefore, each specific instance that an individual precinct was split should be individually examined as a potential deviation from the Redistricting Guidelines. Given that each individual split precinct could not have been split on the basis of any sub-precinct partisan data, it is therefore logical to

analyze whether each of these precincts were split on the basis of the racial sub-precinct-level data that was available to the Reapportionment Office.

When each of the eight split precincts is analyzed individually, there is strong evidence that race was a predominant factor in how these eight precincts were split: As described in my original report, six of the eight precincts were split such that the respective portions of the precincts assigned to HD 105 or HD 111 had a lower African-American share of the Voting Age Population (VAP), while the portions of the precincts *not* assigned to HD 105 or HD 111 had a higher African-American proportion. Given that the Reapportionment Office did not analyze partisan data at the sub-precinct level, this striking racial pattern suggests that racial considerations, not partisanship, explain the particular ways in which these eight precincts were split.

Dr. Alford observes that the portions of the split precincts inside of HD 105 and HD 111 have an *aggregate* racial composition that is more heavily African-American than the portions of the split precincts outside these two districts. But this fact is entirely caused by two precincts - Precinct 60 ("Lawrenceville D") in HD 105 and Precinct 38 ("Hickory Flat") in HD 111 - with geographic patterns of racial segregation that made inevitable the outcome observed by Dr. Alford.

Precinct 60 ("Lawrenceville D") lies at the northwestern corner of HD 105 in the 2015 Plan. The southern half of Lawrenceville D is more heavily African-American than the northern half of the precinct. Furthermore, since Lawrenceville D is at the northwestern corner of HD 105, it is not possible to incorporate the northern half of Lawrenceville D into HD 105 without also including the southern half of Lawrenceville D; otherwise, the geographic contiguity of HD 105 would be violated. Therefore, any decision to split Lawrenceville D would inevitably involve including the southern, more heavily African-American portion of the precinct in HD 105 while excluding the northern, less heavily African-American portion of the precinct.

Finally, it is important to note that the northern portion of Lawrenceville D, which was excluded from HD 105, still has a significantly higher African-American proportion than the overall composition of HD 105 under the 2015 Plan: The November 2016 turnout electorate inside the excluded portion of the Lawrenceville D precinct was 42.7% African-American, while the 2016 turnout electorate within the entire HD 105 district was only 32.9% African-American. It is thus clear that the decision to split the Lawrenceville D precinct and exclude the northern

portion of the precinct from HD 105 had the effect of decreasing HD 105's African-American proportion. Therefore, the particular manner in which the Lawrenceville D precinct was split, by excluding the northern, heavily-African-American portion of the precinct, appears to support the map drawer's overall strategy of splitting precincts so as to minimize the African-American population of HD 105.

A similar explanation applies to Precinct 38 ("Hickory Flat") in HD 111. The western portion of Hickory Flat is more heavily African-American than the eastern portion of the precinct. The Hickory Flat precinct connects to the remainder of HD 111 through the western portion of the precinct. Thus, it is not possible to include the eastern portion of Hickory Flat into HD 111 without also including the western portion of Hickory Flat; otherwise, the geographic contiguity of HD 111 would be violated. Therefore, any decision to split Hickory Flat would inevitably involve including the western, more heavily African-American portion of the precinct in HD 111 while excluding the eastern, less heavily African-American portion of the precinct.

6) Findings Not Rebutted by Dr. Alford's Report

In my report, I analyze results from the six most probative elections for the purpose of examining racially polarized voting within the two districts challenged in this case: The 2012, 2014, and 2016 general house elections in HD 105 and in HD 111. Of those six elections, Dr. Alford did not purport to analyze the two house elections held in November 2014. For the remaining four house elections held in 2012 and 2016, Dr. Alford's report claimed that he analyzed the election results, but his computer code and data files clearly indicate that he instead analyzed the 2012 and 2016 US Presidential elections in Gwinnett and Henry Counties. Dr. Alford's effective failure to analyze any of these six elections is significant because these six elections are the most probative elections when conducting a racially polarized voting analysis of house election results in HD 105 and HD 111.

Dr. Alford did analyze one state house election contest: The 2018 special election for HD 111. Although Dr. Alford's Ecological Inference calculations suffered from the data inaccuracy problems described earlier in this report, his conclusions nevertheless confirm the broader pattern of significant racially polarized voting in HD 111 legislative elections.

My original December 22, 2017 expert report included several additional empirical findings that were not disputed and were not mentioned by Dr. Alford's report. First, I found that

the 2014 House elections exhibited significant racially polarized voting, with over 98% of Black voters supporting Democratic House candidates, while 75-85% of non-Black voters supported Republican candidates. These findings were neither addressed nor disputed by Dr. Alford.

Second, I estimated the hypothetical outcomes of the November 2016 House elections, assuming they had been held under the old 2012 Plan boundaries for HD 105 and HD 111. I found that, under the 2012 Plan boundaries, a Black Democratic candidate would have defeated a White Republican candidate in November 2016, winning approximately 50.3%-54.4% of the vote in the two districts. These findings were neither addressed nor disputed by Dr. Alford.

Third, I found that demographic and partisan changes in HD 105 and HD 111 between 2012 and 2016 explain why a Democratic candidate would have defeated a Republican candidate in November 2016 under the old 2012 Plan boundaries for HD 105 and HD 111. Specifically, my original expert report found that the African-American share of the turnout electorate increased noticeably from November 2012 to November 2016 in both HD 105 and HD 111 under the 2012 Plan. Meanwhile, non-African-American voters within HD 105, as drawn under the 2012 Plan, became somewhat more likely to favor a Black Democratic House candidate in November 2016, compared to previous elections. As a result of these collective racial and partisan shifts, Democratic House candidates' vote share significantly increased among voters residing within the 2012 Plan boundaries for HD 105 and HD 111 from November 2012 to November 2016. All of these findings were neither addressed nor disputed by Dr. Alford.

Fourth, I analyzed the motivations for the redrawing of HD 105 and HD 111 in the 2015 plan. First, I found that the 2015 plan decreased the African-American share of the turnout electorate by 4.0 percentage points in HD 105 and by 2.9 percentage points in HD 111. Overall, in HD 105 and HD 111, I found that the 2015 Plan generally decreased compliance with traditional districting principles and with the principles set forth in the "2011-2012 Guidelines for the House Legislative and Congressional Reapportionment Committee". Specifically, I found that the 2015 Plan worsened compliance with the districting principles of equal population, geographic compactness (as measured by Reock and Popper-Polsby scores), following precinct boundaries, and avoiding county splits, while generally splitting more municipalities than necessary. These findings were neither addressed nor disputed by Dr. Alford.

Finally, given that race and partisanship are highly correlated within these two districts, I also analyzed in my original expert report whether partisan considerations, rather than racial

considerations, could account for the drawing of the new district boundaries in the 2015 plan. I found that the 2015 Plan made a series of precinct-level switches that noticeably decreased the African-American population in both HD 105 and HD 111 while subordinating traditional districting principles and violating the 2011-2012 Redistricting Guidelines. These findings were neither addressed nor disputed by Dr. Alford.

Furthermore, I found that the Legislature's primary map-drawer for the 2015 Plan had access only to racial data, but not partisan data, at the sub-precinct level. Yet strikingly, I also found that the 2015 Plan splits three precincts in HD 105 and five precincts in HD 111 in ways that consistently decreased the African-American share of the population in both districts. The fact that six of eight split precincts were split in ways that decreased the African-American share of the population in HD 105 and HD 111 was neither addressed nor disputed by Dr. Alford.

I declare under penalty of perjury the foregoing is true and correct. Executed this 12th day of February 2018.

Signed:

A handwritten signature in black ink, appearing to read "J. Chen", with a horizontal line underneath.

Jowei Chen

Appendix A:

This appendix is a printout of Dr. Alford's data file: "HD 105/controlfile_2012_processed.dta" listing the actual November 2012 elections analyzed by Dr. Alford's computer code for HD 105 in his January 31, 2018 rebuttal report.

election	contestnumber	contest	candidate	party	candorder	numcand	H	I	J	outcome	race	ElectionID	OfficeID
2012 GE	1	President of the United States	MITT ROMNEY (R)	R	1	3	NA	NA	NA	1	1	2012	1
2012 GE	1	President of the United States	BARACK OBAMA (I)(D)	D	2	3	NA	NA	NA	1	1	2012	1
2012 GE	1	President of the United States	GARY JOHNSON (L)	L	3	3	NA	NA	NA	1	1	2012	1
2012 GE	2	Public Service Commission, District 3 - Metro-Atlanta	CHUCK EATON (R)	R	1	3	NA	NA	NA	1	1	2012	2
2012 GE	2	Public Service Commission, District 3 - Metro-Atlanta	STEPHEN OPPENHEIMER (D)	D	2	3	NA	NA	NA	1	1	2012	2
2012 GE	2	Public Service Commission, District 3 - Metro-Atlanta	BRAD PLOEGER (L)	L	3	3	NA	NA	NA	1	1	2012	2
2012 GE	3	Clerk Superior Court	RICH ALEXANDER (I)(R)	R	1	2	NA	NA	NA	1	1	2012	3
2012 GE	3	Clerk Superior Court	BRIAN WHITESIDE (D)	D	2	2	NA	NA	NA	1	1	2012	3

Appendix B:

This appendix is a printout of Dr. Alford's data file: "HD 105/controlfile_2016_processed.dta" listing the actual November 2016 elections analyzed by Dr. Alford's computer code for HD 105 in his January 31, 2018 rebuttal report.

election	contestnumber	contest	candidate	party	candorder	numcand	H	I	J	outcome	race	ElectionID	OfficeID
2016 GE	1	United States Senator, Isakson	JOHNNY ISAKSON (I)	R	1	3	NA	NA	NA	1	1	2016	1
2016 GE	1	United States Senator, Isakson	JIM BARKSDALE	D	2	3	NA	NA	NA	1	1	2016	1
2016 GE	1	United States Senator, Isakson	ALLEN BUCKLEY	L	3	3	NA	NA	NA	1	1	2016	1
2016 GE	2	President of the United States	DONALD J. TRUMP	R	1	3	NA	NA	NA	1	1	2016	2
2016 GE	2	President of the United States	HILLARY CLINTON	D	2	3	NA	NA	NA	1	1	2016	2
2016 GE	2	President of the United States	GARY JOHNSON	L	3	3	NA	NA	NA	1	1	2016	2
2016 GE	3	CC Chair	C. NASH (I)(R)	R	1	2	NA	NA	NA	1	1	2016	3
2016 GE	3	CC Chair	J. SHEALEY (D)	D	2	2	NA	NA	NA	1	1	2016	3

Appendix C:

This appendix is a printout of Dr. Alford's data file: "HD111\\controlfile_2012_processed.dta" listing the actual November 2012 elections analyzed by Dr. Alford's computer code for HD 111 in his January 31, 2018 rebuttal report.

election	contestnumber	contest	candidate	party	candorder	numcand	notes	outcome	race	ElectionID	OfficeID	election	contestnumber
2012 GE	1	President of the United States	MITT ROMNEY (R)	R	1	3	NA	1	1	2012	1	2012 GE	1
2012 GE	1	President of the United States	BARACK OBAMA (I) D	D	2	3	NA	1	1	2012	1	2012 GE	1
2012 GE	1	President of the United States	GARY JOHNSON (L)	L	3	3	NA	1	1	2012	1	2012 GE	1
2012 GE	2	Public Service Commission, District 3 - Metro-Atlanta	CHUCK EATON (I)R	R	1	3	NA	1	1	2012	2	2012 GE	2
2012 GE	2	Public Service Commission, District 3 - Metro-Atlanta	STEPHEN OPPENHEIMER (D)	D	2	3	NA	1	1	2012	2	2012 GE	2
2012 GE	2	Public Service Commission, District 3 - Metro-Atlanta	BRAD PLOEGER (L)	L	3	3	NA	1	1	2012	2	2012 GE	2
2012 GE	3	District Attorney, Flint Circuit	JIM WRIGHT (R)	R	1	2	NA	1	1	2012	3	2012 GE	3
2012 GE	3	District Attorney, Flint Circuit	DARIUS PATTILLO (D)	D	2	2	NA	1	1	2012	3	2012 GE	3
2012 GE	4	CHAIR COUNTY COMMISSION	TOMMY SMITH (R)	R	1	2	NA	1	1	2012	4	2012 GE	4
2012 GE	4	CHAIR COUNTY COMMISSION	CARLOTTA HARRELL (D)	D	2	2	NA	1	1	2012	4	2012 GE	4

Appendix D:

This appendix is a printout of Dr. Alford's data file: "HD 111/controlfile_2016_processed.dta" listing the actual November 2016 elections analyzed by Dr. Alford's computer code for HD 111 in his January 31, 2018 rebuttal report.

election	contestnumber	contest	candidate	party	candorder	numcand	notes	outcome	race	ElectionID	OfficeID
2016 GE	1	President of the United States	DONALD J. TRUMP	R	1	3	UNITY...	1	1	2016	1
2016 GE	1	President of the United States	HILLARY CLINTON	D	2	3		1	1	2016	1
2016 GE	1	President of the United States	GARY JOHNSON	L	3	3		1	1	2016	1
2016 GE	2	United States Senator, Isakson	JOHNNY ISAKSON (I)	R	1	3		1	1	2016	2
2016 GE	2	United States Senator, Isakson	JIM BARKSDALE	D	2	3		1	1	2016	2
2016 GE	2	United States Senator, Isakson	ALLEN BUCKLEY	L	3	3		1	1	2016	2
2016 GE	3	CLERK, SUPERIOR COURT	B. HARRISON (I) R	R	1	2		1	1	2016	3
2016 GE	3	CLERK, SUPERIOR COURT	S. HILL (D)	D	2	2		1	1	2016	3
2016 GE	4	SHERIFF	R. MCBRAYER (I) R	R	1	2		1	1	2016	4
2016 GE	4	SHERIFF	J. M. ECKLER (D)	D	2	2		1	1	2016	4
2016 GE	5	CORONER	D. CLEVELAND (I) R	R	1	2		1	1	2016	5
2016 GE	5	CORONER	T. BROWN (D)	D	2	2		1	1	2016	5
2016 GE	6	CHAIR COUNTY COMMISSION	J. WOOD (R)	R	1	2		1	1	2016	6
2016 GE	6	CHAIR COUNTY COMMISSION	C. HARRELL (D)	D	2	2		1	1	2016	6

Appendix E:

This appendix is a printout of Dr. Alford's data file: "HD 105/Rdata_2012_contest_1.dta" containing the precinct-level elections analyzed to produce Table 1 of Dr. Alford's January 31, 2018 rebuttal report.

precinct	cand1	cand2	cand3	blktrn	allothturn	novote	OfficeID	ElectionID	cands
60	535	1619	14	1211	960	3	1	2012	3
71	657	1472	17	1079	1070	3	1	2012	3
78	1221	766	13	483	1521	4	1	2012	3
80	1658	1616	29	1143	2173	13	1	2012	3
91	1702	977	32	585	2126	0	1	2012	3
134	1065	1128	13	841	1366	1	1	2012	3
144	720	1837	27	1360	1225	1	1	2012	3
146	2258	904	26	537	2657	6	1	2012	3
147	1391	1418	29	973	1868	3	1	2012	3

Appendix F:**Dr. Alford's computer file titled "elec2012_HD105_contest_1.do";****Used to create results for the first 2012 election contest analyzed in Table 1 of Dr. Alford's January 31, 2018 rebuttal report.**

```

1  /* this file is part of a sequence of files that do one election each for the State of Georgia, HD105 exogenous elections.  Each of these do files
2     gets called from a run file (run_exog.do)
3
4  */
5
6  /* set the home directory and the contest and year globals
7
8     NOTE: Directory of the correct R files are hard coded below, as is the location where those
9     files will be locking for tempdata.
10
11
12  */
13
14  global mystart `C:/Users/andy/Dropbox/'
15
16  global datapath `"_redistricting-shared-rick-randy\Gwinnett - Georgia\_final/'
17
18  global analpath `consulting\State of Georgia\HD105/'
19
20
21
22  global year=2012
23
24      global contest=1
25
26          global numcans=3
27
28
29  /* Bring in the demographics, do transformations, and save as a sorted stata file */
30
31
32  import excel "${mystart}${datapath}${year}\demographics_${year}.xlsx", sheet("Sheet1") firstrow clear
33
34
35  duplicates list precinct_name /* check for duplicate precincts */
36
37
38      gen blktrn=bf+bm
39      gen allothtrn=nvf+nvm+of+om+uu+wf+wm+apf+apm+hsf+hsm
40      gen tottrn=total
41
42      keep if precinct_number==60| ///

```

Appendix F:**Dr. Alford's computer file titled "elec2012_HD105_contest_1.do";****Used to create results for the first 2012 election contest analyzed in Table 1 of Dr. Alford's January 31, 2018 rebuttal report.**

```

43         precinct_number==71| ///
44         precinct_number==78| ///
45         precinct_number==80| ///
46         precinct_number==91| ///
47         precinct_number==134| ///
48         precinct_number==144| ///
49         precinct_number==146| ///
50         precinct_number==147
51
52     rename precinct_number precinct
53     sort precinct
54
55
56     save "${mystart}${analpath}demographics_${year}.dta", replace
57
58 /* bring in the election data for the contest in question, merge with demographics, build no vote variable and save for use in R */
59
60
61     import excel "${mystart}${datapath}${year}\contest_${year}_${contest}.xlsx", sheet("Sheet1") firstrow clear
62
63     capture drop total
64     rename precinct precinct_name2
65     rename precinctid precinct
66
67     sort precinct
68     merge 1:1 precinct using "${mystart}${analpath}demographics_${year}.dta"
69
70     keep if _merge==3
71
72         /* create no vote */
73
74         egen cast=rowtotal(cand*)
75         gen novote=total-cast
76
77         replace allothturn=allothturn+abs(novote) if novote<0 /* so few precincts I cant afford to drop but have to allocate the
78                                     the cast vote so give it to others based on proportionality */
79         replace novote=0 if novote<0
80
81
82 /* add some variables the R file needs to have under certain names */
83
84         gen OfficeID=${contest}

```

Appendix F:**Dr. Alford's computer file titled "elec2012_HD105_contest_1.do";****Used to create results for the first 2012 election contest analyzed in Table 1 of Dr. Alford's January 31, 2018 rebuttal report.**

```

85     gen ElectionID=${year}
86     gen cand=${numcans}
87
88     keep precinct blktrn allothturn ElectionID OfficeID cand* novote
89     sort precinct
90
91
92     save "${mystart}${analpath}\Rdata_${year}_contest_${contest}.dta", replace /* this is the file R will read -- actually we will make a temp file
93         copy of it to read so they will all have the same name */
94
95 /* create the tempdata that R will actually read (the file above is for reference -- change the names of the candidate variables to V's */
96
97
98     local numcans=${numcans}
99
100    foreach kk of numlist 1/`numcans' {
101        rename cand `kk' V`kk'
102    }
103
104    save "C:\Users\randy\Dropbox\consulting\GenericTempData\tempdata.dta", replace
105
106
107
108 /* run the r file - which saves out results as "Rresults", which are then read in and saved under a different name in the correct directory
109
110 Note that there is a kk variable which not needed here -- I leave it in for ease of transition this to a loop
111 */
112
113     local kk=${contest}
114     local numcans=${numcans}
115     local year=${year}
116
117     capture erase "C:\Users\randy\Desktop\GenericResultsFolder\Rresults.dta"
118     if `numcans'==2 {
119         shell "C:\Program Files\R\R-3.3.2\bin\x64\R.exe" CMD BATCH "C:\\Users\\randy\\Dropbox\\consulting\\ALL EI R FILES\\bo_2cand.r"
120
121     preserve
122         drop _all
123         use "C:\Users\randy\Desktop\GenericResultsFolder\Rresults.dta", clear
124         save "C:\Users\randy\Desktop\HD105 Results\exog_`year'_HD105_res`kk'.dta", replace
125     restore
126

```

Appendix F:**Dr. Alford's computer file titled "elec2012_HD105_contest_1.do";****Used to create results for the first 2012 election contest analyzed in Table 1 of Dr. Alford's January 31, 2018 rebuttal report.**

```

127         C:\Users\randy\Dropbox\consulting\ALL EI R FILES
128         local kk=`kk'+1
129     }
130     else if `numcans'==3 {
131         shell "C:\Program Files\R\R-3.3.2\bin\x64\R.exe" CMD BATCH "C:\\Users\\randy\\Dropbox\\consulting\\ALL EI R FILES\\bo_3cand.r"
132
133     preserve
134         drop _all
135         use "C:\Users\randy\Desktop\GenericResultsFolder\Rresults.dta", clear
136         save "C:\Users\randy\Desktop\HD105 Results\exog_`year'_HD105_res`kk'.dta", replace
137     restore
138
139         local kk=`kk'+1
140     }
141     else if `numcans'==4 {
142         shell "C:\Program Files\R\R-3.3.2\bin\x64\R.exe" CMD BATCH "C:\\Users\\randy\\Dropbox\\consulting\\ALL EI R FILES\\bo_4cand.r"
143
144     preserve
145         drop _all
146         use "C:\Users\randy\Desktop\GenericResultsFolder\Rresults.dta", clear
147         save "C:\Users\randy\Desktop\HD105 Results\exog_`year'_HD105_res`kk'.dta", replace
148     restore
149
150         local kk=`kk'+1
151     }
152     else if `numcans'==5 {
153         shell "C:\Program Files\R\R-3.3.2\bin\x64\R.exe" CMD BATCH "C:\\Users\\randy\\Dropbox\\consulting\\ALL EI R FILES\\bo_5cand.r"
154
155     preserve
156         drop _all
157         use "C:\Users\randy\Desktop\GenericResultsFolder\Rresults.dta", clear
158         save "C:\Users\randy\Desktop\HD105 Results\exog_`year'_HD105_res`kk'.dta", replace
159     restore
160
161         local kk=`kk'+1
162     }
163 }
164
165
166

```

Appendix G:**Dr. Alford's computer file titled "elec2012_HD105_contest_2.do";****Used to create results for the second 2012 election contest analyzed in Table 1 of Dr. Alford's January 31, 2018 rebuttal report.**

```

1
2 /* this file is part of a sequence of files that do one election each for the State of Georgia, HD105 exogenous elections. Each of these do files
3 gets called from a run file (run_exog.do)
4
5 */
6
7 /* set the home directory and the contest and year globals
8
9     NOTE: Directory of the correct R files are hard coded below, as is the location where those
10 files will be looking for tempdata.
11
12 */
13
14     global mystart `C:/Users/andy/Dropbox/'
15
16     global datapath `"_redistricting-shared-rick-randy\Gwinnett - Georgia\_final/'
17
18     global analpath `consulting\State of Georgia\HD105/'
19
20
21
22
23     global year=2012
24
25         global contest=2
26
27             global numcans=3
28
29
30 /* Bring in the demographics, do transformations, and save as a sorted stata file */
31
32
33     import excel "${mystart}${datapath}${year}\demographics_${year}.xlsx", sheet("Sheet1") firstrow clear
34
35
36     duplicates list precinct_name /* check for duplicate precincts */
37
38
39         gen blktrn=bf+bm
40         gen allothturn=nvf+nvm+of+om+uu+wf+wm+apf+apm+hsf+hsm
41         gen tottrn=total
42

```

Appendix G:

Dr. Alford's computer file titled "elec2012_HD105_contest_2.do";

Used to create results for the second 2012 election contest analyzed in Table 1 of Dr. Alford's January 31, 2018 rebuttal report.

```

43         keep if precinct_number==60| ///
44             precinct_number==71| ///
45             precinct_number==78| ///
46             precinct_number==80| ///
47             precinct_number==91| ///
48             precinct_number==134| ///
49             precinct_number==144| ///
50             precinct_number==146| ///
51             precinct_number==147
52
53     rename precinct_number precinct
54     sort precinct
55
56
57     save "${mystart}${analpath}demographics_${year}.dta", replace
58
59 /* bring in the election data for the contest in question, merge with demographics, build no vote variable and save for use in R */
60
61
62     import excel "${mystart}${datapath}${year}\contest_${year}_${contest}.xlsx", sheet("Sheet1") firstrow clear
63
64     capture drop total
65     rename precinct precinct_name2
66     rename precinctid precinct
67
68     sort precinct
69     merge 1:1 precinct using "${mystart}${analpath}demographics_${year}.dta"
70
71
72
73     /* create no vote */
74
75     egen cast=rowtotal(cand*)
76     gen novote=total-cast
77     drop if novote<0
78
79 /* add some variables the R file needs to have under certain names */
80
81     gen OfficeID=${contest}
82     gen ElectionID=${year}
83     gen cand=${numcans}
84

```

Appendix G:

Dr. Alford's computer file titled "elec2012_HD105_contest_2.do";

Used to create results for the second 2012 election contest analyzed in Table 1 of Dr. Alford's January 31, 2018 rebuttal report.

```

85         keep precinct blktrn allothturn ElectionID OfficeID cand* novote
86         sort precinct
87
88
89         save "${mystart}${analpath}\Rdata_${year}_contest_${contest}.dta", replace /* this is the file R will read -- actually we will make a temp file
90             copy of it to read so they will all have the same name */
91
92 /* create the tempdata that R will actually read (the file above is for reference -- change the names of the candidate variables to V's */
93
94
95         local numcans=${numcans}
96
97         foreach kk of numlist 1/`numcans' {
98             rename cand`kk' V`kk'
99         }
100
101         save "C:\Users\randy\Dropbox\consulting\GenericTempData\tempdata.dta", replace
102
103
104
105 /* run the r file - which saves out results as "Rresults", which are then read in and saved under a different name in the correct directory
106
107         Note that there is a kk variable which not needed here -- I leave it in for ease of transition this to a loop
108 */
109
110         local kk=${contest}
111         local numcans=${numcans}
112         local year=${year}
113
114         capture erase "C:\Users\randy\Desktop\GenericResultsFolder\Rresults.dta"
115         if `numcans'==2 {
116             shell "C:\Program Files\R\R-3.3.2\bin\x64\R.exe" CMD BATCH "C:\\Users\\randy\\Dropbox\\consulting\\ALL EI R FILES\\bo_2cand.r"
117
118         preserve
119             drop _all
120             use "C:\Users\randy\Desktop\GenericResultsFolder\Rresults.dta", clear
121             save "C:\Users\randy\Desktop\HD105 Results\exog_`year'_HD105_res`kk'.dta", replace
122         restore
123
124         C:\Users\randy\Dropbox\consulting\ALL EI R FILES
125         local kk=`kk'+1
126     }

```


Appendix G:**Dr. Alford's computer file titled "elec2012_HD105_contest_2.do";****Used to create results for the second 2012 election contest analyzed in Table 1 of Dr. Alford's January 31, 2018 rebuttal report.**

```

127     else if `numcans'==3 {
128         shell "C:\Program Files\R\R-3.3.2\bin\x64\R.exe" CMD BATCH "C:\\Users\\randy\\Dropbox\\consulting\\ALL EI R FILES\\bo_3cand.r"
129
130     preserve
131         drop _all
132         use "C:\Users\randy\Desktop\GenericResultsFolder\Rresults.dta", clear
133         save "C:\Users\randy\Desktop\HD105 Results\exog_`year'_HD105_res`kk'.dta", replace
134     restore
135
136         local kk=`kk'+1
137     }
138 }
139 else if `numcans'==4 {
140     shell "C:\Program Files\R\R-3.3.2\bin\x64\R.exe" CMD BATCH "C:\\Users\\randy\\Dropbox\\consulting\\ALL EI R FILES\\bo_4cand.r"
141
142     preserve
143         drop _all
144         use "C:\Users\randy\Desktop\GenericResultsFolder\Rresults.dta", clear
145         save "C:\Users\randy\Desktop\HD105 Results\exog_`year'_HD105_res`kk'.dta", replace
146     restore
147
148         local kk=`kk'+1
149     }
150 }
151 else if `numcans'==5 {
152     shell "C:\Program Files\R\R-3.3.2\bin\x64\R.exe" CMD BATCH "C:\\Users\\randy\\Dropbox\\consulting\\ALL EI R FILES\\bo_5cand.r"
153
154     preserve
155         drop _all
156         use "C:\Users\randy\Desktop\GenericResultsFolder\Rresults.dta", clear
157         save "C:\Users\randy\Desktop\HD105 Results\exog_`year'_HD105_res`kk'.dta", replace
158     restore
159
160         local kk=`kk'+1
161     }
162 }
163

```

Appendix H:**Dr. Alford's computer file titled "elec2012_HD105_contest_3.do";****Used to create results for the third 2012 election contest analyzed in Table 1 of Dr. Alford's January 31, 2018 rebuttal report.**

```

1
2 /* this file is part of a sequence of files that do one election each for the State of Georgia, HD105 exogenous elections. Each of these do files
3 gets called from a run file (run_exog.do)
4
5 */
6
7 /* set the home directory and the contest and year globals
8
9     NOTE: Directory of the correct R files are hard coded below, as is the location where those
10 files will be looking for tempdata.
11
12 */
13
14     global mystart `C:/Users/andy/Dropbox/'
15
16     global datapath `"_redistricting-shared-rick-randy\Gwinnett - Georgia\_final/'
17
18     global analpath `consulting\State of Georgia\HD105/'
19
20
21
22
23     global year=2012
24
25         global contest=3
26
27             global numcans=2
28
29
30 /* Bring in the demographics, do transformations, and save as a sorted stata file */
31
32
33     import excel "${mystart}${datapath}${year}\demographics_${year}.xlsx", sheet("Sheet1") firstrow clear
34
35
36     duplicates list precinct_name /* check for duplicate precincts */
37
38
39         gen blktrn=bf+bm
40         gen allothturn=nvf+nvm+of+om+uu+wf+wm+apf+apm+hsf+hsm
41         gen tottrn=total
42

```

Appendix H:**Dr. Alford's computer file titled "elec2012_HD105_contest_3.do";****Used to create results for the third 2012 election contest analyzed in Table 1 of Dr. Alford's January 31, 2018 rebuttal report.**

```

43         keep if precinct_number==60| ///
44             precinct_number==71| ///
45             precinct_number==78| ///
46             precinct_number==80| ///
47             precinct_number==91| ///
48             precinct_number==134| ///
49             precinct_number==144| ///
50             precinct_number==146| ///
51             precinct_number==147
52
53     rename precinct_number precinct
54     sort precinct
55
56
57     save "${mystart}${analpath}demographics_${year}.dta", replace
58
59 /* bring in the election data for the contest in question, merge with demographics, build no vote variable and save for use in R */
60
61
62     import excel "${mystart}${datapath}${year}\contest_${year}_${contest}.xlsx", sheet("Sheet1") firstrow clear
63
64     capture drop total
65     rename precinct precinct_name2
66     rename precinctid precinct
67
68     sort precinct
69     merge 1:1 precinct using "${mystart}${analpath}demographics_${year}.dta"
70
71
72
73     /* create no vote */
74
75     egen cast=rowtotal(cand*)
76     gen novote=total-cast
77     drop if novote<0
78
79 /* add some variables the R file needs to have under certain names */
80
81     gen OfficeID=${contest}
82     gen ElectionID=${year}
83     gen cand=${numcans}
84

```

Appendix H:**Dr. Alford's computer file titled "elec2012_HD105_contest_3.do";****Used to create results for the third 2012 election contest analyzed in Table 1 of Dr. Alford's January 31, 2018 rebuttal report.**

```

85         keep precinct blktrn allothturn ElectionID OfficeID cand* novote
86         sort precinct
87
88
89         save "${mystart}${analpath}\Rdata_${year}_contest_${contest}.dta", replace /* this is the file R will read -- actually we will make a temp file
90             copy of it to read so they will all have the same name */
91
92 /* create the tempdata that R will actually read (the file above is for reference -- change the names of the candidate variables to V's */
93
94
95         local numcans=${numcans}
96
97         foreach kk of numlist 1/'numcans' {
98             rename cand`kk' V`kk'
99         }
100
101         save "C:\Users\randy\Dropbox\consulting\GenericTempData\tempdata.dta", replave
102
103
104
105 /* run the r file - which saves out results as "Rresults", which are then read in and saved under a different name in the correct directory
106
107         Note that there is a kk variable which not needed here -- I leave it in for ease of transition this to a loop
108 */
109
110         local kk=${contest}
111         local numcans=${numcans}
112         local year=${year}
113
114         capture erase "C:\Users\randy\Desktop\GenericResultsFolder\Rresults.dta"
115         if `numcans'==2 {
116             shell "C:\Program Files\R\R-3.3.2\bin\x64\R.exe" CMD BATCH "C:\\Users\\randy\\Dropbox\\consulting\\ALL EI R FILES\\bo_2cand.r"
117
118         preserve
119             drop _all
120             use "C:\Users\randy\Desktop\GenericResultsFolder\Rresults.dta", clear
121             save "C:\Users\randy\Desktop\HD105 Results\exog_`year'_HD105_res`kk'.dta", replace
122         restore
123
124
125     }
126     else if `numcans'==3 {

```

Appendix H:**Dr. Alford's computer file titled "elec2012_HD105_contest_3.do";****Used to create results for the third 2012 election contest analyzed in Table 1 of Dr. Alford's January 31, 2018 rebuttal report.**

```

127         shell "C:\Program Files\R\R-3.3.2\bin\x64\R.exe" CMD BATCH "C:\\Users\\randy\\Dropbox\\consulting\\ALL EI R FILES\\bo_3cand.r"
128
129     preserve
130         drop _all
131         use "C:\Users\randy\Desktop\GenericResultsFolder\Rresults.dta", clear
132         save "C:\Users\randy\Desktop\HD105 Results\exog_`year`_HD105_res`kk`.dta", replace
133     restore
134
135
136
137 }
138 else if `numcans'==4 {
139     shell "C:\Program Files\R\R-3.3.2\bin\x64\R.exe" CMD BATCH "C:\\Users\\randy\\Dropbox\\consulting\\ALL EI R FILES\\bo_4cand.r"
140
141     preserve
142         drop _all
143         use "C:\Users\randy\Desktop\GenericResultsFolder\Rresults.dta", clear
144         save "C:\Users\randy\Desktop\HD105 Results\exog_`year`_HD105_res`kk`.dta", replace
145     restore
146
147
148
149 }
150 else if `numcans'==5 {
151     shell "C:\Program Files\R\R-3.3.2\bin\x64\R.exe" CMD BATCH "C:\\Users\\randy\\Dropbox\\consulting\\ALL EI R FILES\\bo_5cand.r"
152
153     preserve
154         drop _all
155         use "C:\Users\randy\Desktop\GenericResultsFolder\Rresults.dta", clear
156         save "C:\Users\randy\Desktop\HD105 Results\exog_`year`_HD105_res`kk`.dta", replace
157     restore
158
159
160 }
161
162

```