EXHIBIT 2

EXHIBIT E

Plaintiffs' Exhibit 281

IN THE UNITED STATES DISTRICT COURT
FOR THE MIDDLE DISTRICT OF NORTH CAROLINA

NORTH CAROLINA STATE CONFERENCE OF THE NAACP, *et al.*, *Plaintiffs*, v. ROY ASBERRY COOPER III, in his official capacity as the Governor of North Carolina, *et al.*, *Defendants*.	No. 1:18-cv-01034

REBUTTAL REPORT OF
MICHAEL C. HERRON
FOR PURPOSES OF PRELIMINARY INJUNCTION

Introduction

1. This rebuttal is a response to "Response Report of Janet R. Thornton, Ph.D.," hereinafter the *Thornton report*, filed in this litigation on October 30, 2019. The Thornton report seeks to engage the conclusions in, "Analysis of the Racial Composition of the August 2019 No-Match List of Registered Voters in North Carolina," hereinafter my *original report*, a report I wrote for the purposes of a preliminary injunction. My original report was filed on September 16, 2019.

Summary

2. The objective of my original report was as follows: "compar[ing] the racial and ethnic composition of the no-match list with the racial and ethnic composition of North Carolina registered voters whose names do not appear on the no-match list" (pp. 4-5, paragraph 9). The no-match list is a list of 617,029 registered voters in North Carolina, created by the North Carolina State Board of Elections (NCSBE). The no-match list identifies registered voters whose identifying information in the NCSBE's voter registration database cannot be matched to records maintained by the North Carolina Division of Motor Vehicle (DMV).

3. Dr. Thornton claims that, "[Dr. Herron] assume[s] that none of the 617K registered voters on the [no-match list] generated by the NCSBE have an acceptable form of ID under SB 824." (p. 5, paragraph 17). This is an inaccurate and misleading statement. My report does not offer an assessment of the accuracy of the no-match list, and in fact it states that, due to uncertainties about how the list was created, I could not opine on the list's accuracy (see p. 10, paragraph 25 of my original report). My report also does not state that all voters on the no-match list will be unable to vote for lack of a valid form of voter identification. In fact, the report makes it clear that the no-match list addresses only two forms of voter identification that

a voter in North Carolina may use to comply with SB 824 (p. 30, paragraph 66).

4. Dr. Thornton asserts that my original report disregards the distinction between "active" and "inactive" voters. These two categories are official designations in North Carolina, and both active and inactive voters are fully registered voters in the state and have equal rights to vote. This explains why I did not treat them separately. As noted in my original report, the NCSBE, in creating the no-match list, also appears to have disregarded the distinction between active and inactive voters. Moreover, my original report's key conclusions about the racial composition of the no-match list apply even restricting attention to active registered voters only.

5. My original report shows that registered voters on the no-match list are disproportionately black and Hispanic compared to the registered voter pool in North Carolina. Not just statewide, but in almost every North Carolina county, the rate at which black registered voters appear on the no-match list exceeds the rate at which white registered voters appear on the no-match list. And, in almost every North Carolina county, the rate at which Hispanic registered voters appear on the no-match list exceeds that of the rate at which non-Hispanic registered voters appear on the no-match list. In her report, Dr. Thornton disputes neither my racial and ethnic analyses of the no-match list nor my racial and ethnic characterization of registered voters in North Carolina who are not on the no-match list.

6. In her report, Dr. Thornton argues that registered voters on the no-match list who participated in North Carolina's March 2016 Primary with "high probability" (p. 17, paragraph 36) have—despite their presence on the no-match list—an acceptable form of voter identification per SB 824. Regardless of the veracity of this claim, I show that the individuals on the no-match list who voted in the March 2016 Primary are disproportionately black and the individuals on the no-match list who did not vote it the March 2016 are also disproportionately

black. Similarly, the individuals on the no-match list who voted in the March 2016 Primary are disproportionately Hispanic and the individuals on the no-match list who did not vote it the March 2016 are also disproportionately Hispanic. In other words, that the no-match list contains disproportionately many black and Hispanic registered voters compared to the North Carolina registered voter pool holds regardless of whether one takes the March 2016 Primary into consideration.

7. Dr. Thornton asserts that missing data in the NCSBE's list of registered voters diminishes the value of the no-match list in identifying registered voters in North Carolina who do not have acceptable forms of voter DMV identification per SB 824. Her argument, however, depends in part on circular logic. To wit, registered voters in North Carolina who lack driver's licenses will, by definition, likely have missing driver's license data in the NCSBE's list of registered voters. Therefore, if an individual in the NCSBE's list of registered voters has a missing driver's license number, this individual is not necessarily at risk of what Dr. Thornton labels a *false negative*, a result indicating that the individual does not have a driver's license when she actually does, as Dr. Thornton asserts. Rather, such an individual may be at risk of a *false positive*, a result that the individual has a driver's license when she actually does not. To the extent that the no-match list is affected by false positives, this list understates the number of registered voters in North Carolina who lack driver's licenses.[1]

8. Dr. Thornton argues that missing social security number data in the NCSBE's list of registered voters is problematic and possibly causes excessive numbers of false negatives

[1] I am using the terms false negative and false positive in a way that is consistent with Dr. Thornton's report. See p. 14, paragraph 29, where she states: "Errors of omission are also sometimes called 'false negatives' and they refer to instances when a match should have occurred between the DMV or external source data and the list of registered voters but did not, resulting in the person being erroneously identified as lacking an ID."

in the no-match list, thus overstating the number of registered voters in North Carolina who lack driver's licenses.[2] Nonetheless, when I restrict attention to registered voters who do not lack social security numbers in the NCSBE database, those on the no-match list remain disproportionately black and Hispanic. At the same time, restricting attention to registered voters who do lack social security numbers, those on the no-match list are also disproportionately black and Hispanic. Thus, regardless of one's position on whether a missing social security number is problematic for the accuracy of the no-match list, registered voters in North Carolina on the no-match list are disproportionately black and Hispanic.

9. The less wealthy a North Carolina county, the greater the extent of missing data, and in particular missing social security numbers, in the NCSBE's list of registered voters. This implies that social security number missingness is systematic. While Dr. Thornton speculates that social security number missingness portends a risk of false negatives on the no-match list, I note that missingness in the NCSBE's list of registered voters is consistent with the idea that poor registered voters in North Carolina have lower access to forms of identification than non-poor registered voters. Missingness is thus consistent with an absence of driver's licenses and thus may not be the case of false negatives in the no-match list.

10. Dr. Thornton devises a database matching method that, she claims, dramatically reduces the size of the no-match list. Her method, however, uses matching criteria that are weaker than those Dr. Thornton criticizes elsewhere in her report. Furthermore, the method adduced by Dr. Thornton is biased in the direction of reducing the size of the no-match list.

Organization of this rebuttal report

[2] When in this report I refer to social security numbers, I mean the last four digits of such numbers.

11. What follows in this report is broken into separate sections. Each section responds to a critique that Dr. Thornton leveled at my original report. Following my response to Dr. Thornton's critiques, I offer a brief conclusion.

Dr. Thornton does not address the objective of my original report on the no-match list: assessing whether there are racial and ethnic disparities between this list and the North Carolina registered voter pool

12. My original report was explicit about its objective: assessing the racial and ethnic composition of the no-match list, a list created by the NCSBE.

13. It is evident from her report that Dr. Thornton is critical of the process that went into generating the no-match list, and I share Dr. Thornton's recognition that any database matching exercise, as exemplified by the exercise that generated the no-match list, is subject to error. Matching errors can be false negatives (an individual on the no-match list actually has a driver's license) or false positives (an individual not on the no-match list does not have a driver's license).[3]

14. The two largest racial groups in North Carolina are black and white. In light of its stated objective, my report notes that the white registered voter no-match rate, per the no-match list, is approximately 6.5 percent and the black no-match rate, approximately 10.6 percent (p. 21, Table 3). To be clear, what I describe as the white (black) no-match rate is the percent at which white (black) registered voters in North Carolina appear on the no-match list.

15. Key here is the *difference* between the black and white registered voter no-match rates in North Carolina. The reason this difference is important is because it describes the extent to which the no-match list contains registered voters of one racial group or another. This no-

[3] Dr. Thornton defines "false negative" on p. 14, paragraph 29, of her report.

match list's black-white difference is approximately 4.1 percentage points (see my original report, p. 22, paragraph 50).

16. Regarding ethnicity, the NCSBE database on registered voters in North Carolina associates each such individual with one of two ethnicities: Hispanic, non-Hispanic, and unknown.[4] The Hispanic no-match rate is approximately 11.1 percent, and the non-Hispanic rate, approximately 5.7 percent. These two numbers yield a 5.4 percentage point gap in no-match rates between Hispanic and non-Hispanic registered voters in North Carolina (see p. 25, Table 5, of my original report).

17. The black-white and Hispanic-non-Hispanic gaps in the no-match list are both positive. This implies that the no-match list contains a disproportionate number of minority registered voters. This conclusion appears in my original report.

18. Dr. Thornton does not challenge or even discuss in her report the white, black, Hispanic, and non-Hispanic no-match rates that I calculated. She claims neither that they are too high (biased up) nor that they are too low (biased down). She does not suggest any alternatives to these rates. Dr. Thornton similarly does not discuss the 4.1 percentage point black-white difference that I calculated from the NCSBE's no-match list. Dr. Thornton asserts neither that this difference is too high (biased up) nor that it is too low (biased down). Similar comments apply to the 5.7 percentage point difference between Hispanic and non-Hispanic no-match rates.

[4] My comments here on ethnicity are restricted to registered voters with registration years of 2003 or later. This is because, prior to 2002, the NCSBE did not track the Hispanic status of North Carolina registered voters. See p. 15, footnote 12, of my original report. The NCSBE database used by Dr. Thornton in her report does not include date of registration. I merged this field into Dr. Thornton's database using the voter file described in my original report.

19. Individuals who lack SB 824-required forms of voter identification are burdened by this legislation. That said, Dr. Thornton asserts as follows: "Both Drs. Lichtman and Herron assume that NCSBE's over-inclusive list of 617K registered voters which did not readily match to DMV data is evidence that SB 824 will be more burdensome to African-American and Hispanic registered voters" (p. 13, paragraph 27). This is a mischaracterization of my original report, and reasons for this are twofold.

20. First, and with respect to "617K registered voters," my report did not rely on the accuracy of the absolute number of non-matched registered voters to reach conclusions regarding the increased burden SB 824 places on African-American and Hispanic registered voters. I have already stated that the algorithm that generated the no-match list, like all database matching algorithms, is subject to both false negatives and false positives. Rather, my report analyzed the racial composition of the no-match list to conclude that SB 824 imposes a greater burden on African American and Hispanic voters. As the remainder of this rebuttal report shows, I can approach the no-match list in many ways, in part to address Dr. Thornton's critiques, and in every instance I find evidence that non-matched registered voters in North Carolina are disproportionately black and disproportionately Hispanic.

21. Second, and with respect to "DMV data," my original report states clearly that SB 824 allows for multiple forms of voter identification. On p. 30, paragraph 66, it reads as follows: "SB 824 lists a variety of forms of voter identification that registered voters in North Carolina can use for the purposes of voter identification. The first two forms listed in this piece of legislation are a North Carolina driver's license and a non-operator identification card."

22. If a group of registered voters in North Carolina has less access to a form of voter identification on the list of SB 824-permitted forms of identification, then it follows that

this group, compared to registered voters not in the group, is disproportionately burdened by SB 824.

23. SB 824 allows registered North Carolina voters to use United States passports as a form of voter identification.[5] I do not have access to data on which registered voters in North Carolina have passports. I also do not have access to data on which registered voters in North Carolina have military identification cards and tribal enrollment cards, two other forms of identification permitted by SB 824. All of my conclusions are based on access to North Carolina driver's licenses and non-operator identification cards, the first two forms of identification listed in SB 824. It is my understanding that other experts for the plaintiffs in this litigation are engaging questions about the rates at which North Carolina registered voters possess forms of identification beyond those associated with the North Carolina DMV.

24. In this section of my rebuttal, I explained that Dr. Thornton does not engage my report's key conclusions about the racial and ethnic composition of the no-match list. My original report provides various race-based and ethnicity-based percentages about the extent to which race and ethnic groups in North Carolina appear on this list, and Dr. Thornton neither challenges the percentages I offered nor suggests alternative figures.

Both active and inactive voters are fully registered voters

25. The NCSBE has two statuses of individuals who are permitted to vote in elections in the state, and these are called "active" and "inactive." Both active and inactive registered voters can vote in North Carolina. Dr. Thornton asserts the my original report disregards the distinction between "active" and "inactive" voters.

[5] For the text of SB 824, see https://www.ncleg.gov/Sessions/2017/Bills/Senate/PDF/S824v7.pdf (last accessed November 11, 2019).

26. Dr. Thornton writes (p. 17, paragraph 34) that, "To the extent that the inactive voters are not engaged voters (voters for whom the lack of a voter ID would not have any impact) this distinction is important." I respectfully disagree. An eligible individual's right to vote in North Carolina is not conditional on having voted in recent elections, and this is important insofar as not voting in North Carolina can land a voter on the list of "inactive" registered voters in the state. There are many reasons that an individual may choose not to vote, and SB 824 can burden a group of voters even if members of the group have recently not exercised their franchise. For these reasons, there is no basis for distinguishing between active and inactive voters in assessing the racial composition of the no-match list.

Table 1: Statewide no-match rates by racial group, active registered voters only

County	Registered voters	No-match rate
White	3,980,407	5.2
Black	1,191,888	9.4
Undesignated	297,225	13.0
Other	147,961	6.1
Asian	77,569	7.3
American Indian	41,358	12.5
Multiple races	32,989	11.8

27. Notwithstanding my argument that inactive voters should be included in any analysis of the burdens of SB 824, Table 1 describes for North Carolina's racial groups the no-match rates for active registered voters only. This table is similar to Table 3 (p. 21) of my original report.

28. The two key no-match rates in Table 1 are those for white registered voters (5.2 percent) and black registered voters (9.4 percent). These two rates are slightly lower than corresponding no-match rates in my original report (6.5 percent and 10.6 percent, respectively). And, the black-white gap in no-match rates among registered voters is 4.2 percentage points,

which is quite similar albeit slightly larger than the black-white gap of 4.1 percentage points in my original report.

29. Insofar as the objective of my report was assessing the racial and ethnic composition of the no-match list and considering whether all racial and ethnic groups are treated equally by SB 824, I have shown that, even with Dr. Thornton's critique about active versus inactive registered voters, black registered voters in North Carolina are more heavily burdened than white registered voters.

Table 2: Statewide no-match rates by ethnicity, restricted to registered voters whose year of registration is 2003 or after, active registered voters only

Ethnicity	Registered voters	No-match rate
Not Hispanic	2,584,052	3.8
Unknown	1,068,915	8.4
Hispanic	154,456	8.4
Not Hispanic, white	1,884,425	3.0

30. Continuing with this logic, Table 2 reports no-match rates by ethnicity for active registered voters only, and this table parallels my original report's Table 5 (p. 25). Key in Table 2 are the Hispanic no-match rate for active voters—8.4 percent—and the non-Hispanic no-match rate for active voters—3.8 percent. These two figures yield a Hispanic/non-Hispanic gap of 4.6 percentage points. In my original report, which incorporated both active and inactive voters, the Hispanic and non-Hispanic no-match rates were 11.1 percent and 5.7 percent, respectively, yielding a Hispanic/non-Hispanic gap of 5.4 percentage points. Thus, restricting attention to active voters lowers the no-match rates of North Carolina's two key ethnic groups but barely diminishes the gaps in no-match rates between these groups.

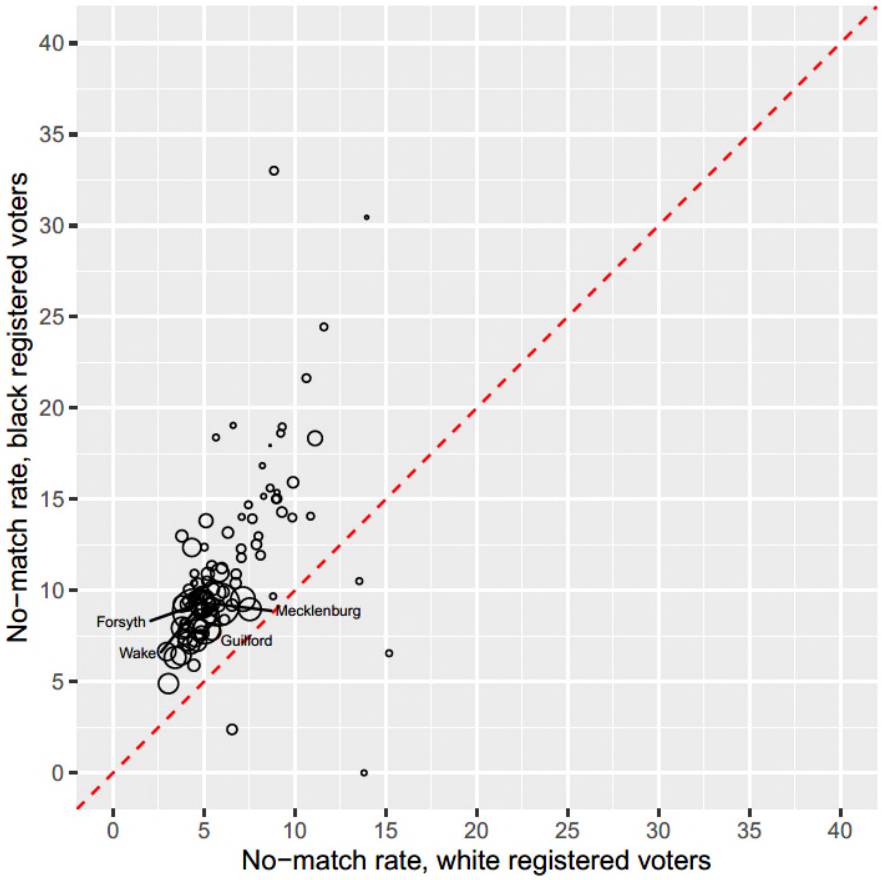
31. In my original report, I presented a variety of county-level plots that examined black and white no-match rates by county. The reason I did this was to explore whether the

statewide racial difference I observed in no-match rates were restricted to a particular region of North Carolina.

32. I now reproduce Figure 2 (p. 23) of my original report, this time restricting attention only to active registered voters in North Carolina. The updated graphic can be found in Figure 1.

33. Figure 1 and its antecedent in my original report are qualitatively identical: restricting attention to active registered voters or not, in virtually every North Carolina county blacks are disproportionately represented on the no-match list.

Figure 1: White and black no-match rates by county, active registered voters only



Note: each point corresponds to a North Carolina county, and counties with at least 200,000 registered voters are highlighted.

34. In this section of my rebuttal, I have responded to a critique leveled by Dr. Thornton at my analysis of racial and ethnic no-match rates among North Carolina registered voters. I do not believe that separating out inactive voters from an analysis of the burdens of a state electoral law like SB 824 is justified. Nonetheless, I followed the path that I believe Dr. Thornton would have wanted, disregarding inactive voters, and I have once again found racial and ethnic disparities in no-match rates. Even restricting attention to active voters in North Carolina only, whites have lower no-match rates than blacks and non-Hispanics have lower no-match rates than Hispanics.

The registered voters on the no-match list who voted in the March 2016 Primary are disproportionately black and Hispanic, and so are the registered voters on the no-match list who did not vote in the March 2016 Primary

35. On p. 17 of her report, Dr. Thornton comments on the North Carolina registered voters who participated in the March 2016 Primary Election. She asserts that these individuals have a "high probability" of having an SB 824-approved form of voter identification. Dr. Thornton states that approximately 22 percent of the no-match list voted in the Primary, and I have replicated this result. In particular, I find 137,004 registered voters on the no-match list who voted in the 2016 Primary.[6]

36. Table 3 reports no-match rates broken down by race (for black and white registered voters) and by participation in the 2016 Primary in North Carolina. The top two rows of the table are associated with registered voters in who did not vote in the primary, and the bottom, with registered voters who did.

[6] To identify voters who participated in the 2016 Primary, I examined the file named "VOTER HISTORY.txt," which is part of an archive of files produced by the State named 2018-08-15_VoterIdLawsuit.

Table 3: No-match rates by race and voting history from March 2016 Primary

2016 Primary	Race	Registered voters	No-match rate
No	Black	1,056,776	13.08
No	White	2,933,993	8.54
Yes	Black	400,009	9.91
Yes	White	1,601,076	5.55

37. Among both voters and non-voters in the 2016 Primary, there are disproportionately more blacks than whites on the no-match list. In both cases, the black-white gap is approximately four percentage points. Thus, regardless of whether one focuses on voters or non-voters in the 2016 Primary, the main race-based conclusion of my original report—that blacks appear on the no-match list disproportionately often compared to whites—holds.

38. Table 4 is similar except that it is ethnicity-based. points. It shows that, regardless of whether one focuses on voters or non-voters in the 2016 Primary, the main ethnicity-based conclusion of my original report—Hispanics appear on the no-match list disproportionately more often compared to non-Hispanics—holds.

Table 4: No-match rates by ethnicity and voting history from March 2016 Primary

2016 Primary	Ethnicity	Registered voters	No-match rate
No	Hispanic	167,769	12.73
No	Not Hispanic	2,426,775	7.24
No	Unknown	1,043,634	13.71
Yes	Hispanic	24,280	6.58
Yes	Not Hispanic	695,681	3.34
Yes	Unknown	238,017	5.56

Missing data in the North Carolina list of registered voters are correlated with county wealth

39. Dr. Thornton argues that missing data in the North Carolina list of registered voters undermines the quality of the no-match list and in particular lead to an over-inclusive list. Since, she states, data fields in the list of registered voters are needed to match voters to

individual records in data maintained by the North Carolina DMV, individuals with missing data are prone to being incorrectly placed on the no-match list.

Overview of missing data in the NCSBE list of registered voters

40. In her report, Dr. Thornton focuses on three data fields that can have missing data: social security number, driver's license number, and birth date. These are noted in her Table 5 (p. 15).

41. Using the data sources in Dr. Thornton's Table 5, I replicated the entries in the table with some minor slippage on figures that involve records with missing birth dates. Dr. Thornton does not, in her report, specify exactly how she identifies individual voter records with missing birth dates. There are records in the North Carolina list of registered voters that have birth years of 1900, and these are records for which official birth dates are missing. There are also some records with birth years that are clearly erroneous. I noted these in my original report (pp. 31–35). That part of my report showed as well that my report's main conclusions hold even when restricting attention to North Carolina registered voters with birthdates after 1918.

42. While I was not able to replicate the exact missing birth date percentages in Dr. Thornton's Table 5, my efforts in this vein were very close. Since the number of registered voters with missing birth dates is very small, both by Dr. Thornton's assessments and by mine, and since my original report notes that its conclusions hold regardless of whether individuals with suspicious birth dates are dropped from consideration, I do not engage missing birth dates from this point onward in this rebuttal report.

Missing driver's license numbers

43. I now consider the issue of missing driver's license numbers. Regarding this

issue, Dr. Thornton notes that 65.61 percent of registered voter records in the no-match list are missing a driver's license number. Dr. Thornton interprets this in a way that I find circular.

44. Dr. Thornton writes as follows: "As a consequence [of missing social security numbers, driver's license numbers and birth dates], even if the 617K had a DMV-issued ID, this group of registered voters would be more likely to be a false negative with respect to NCSBE's matching protocol" (p. 14). If a registered voter does not possess a driver's license, then this individual's record in the NCSBE registered voter database will not have a driver's license number. Dr. Thornton would label such an absence of a driver's license number missing data, but that is a misleading use of the word, "missing." When a registered North Carolina voter who does not have a driver's license has no driver's license number associated with her registration records, I would label this as, "accurate."

45. I cannot tell from the no-match list and the other data at my disposal whether an NCSBE voter record with a missing driver's license number is indicative of a non-existent driver's license or is indicative of missing data in the presence of an existent driver's license. Given this ambiguity, it is my judgment that missing driver's license numbers in the North Carolina voter database cannot be interpreted as necessarily problematic in the sense of leading to false negatives in the no-match list.

Missing social security numbers

46. I now turn to the issue of missing social security numbers in the NCSBE database of registered voters.

47. I consider first the validity of Dr. Thornton's conjecture that voter records with missing social security numbers are "more likely" to reflect false negatives, i.e., to be associated with registered voters on the no-match list who should not be on it. This conjecture depends on

the reason, or reasons, for social security number missingness in the NCSBE list of registered voters in North Carolina. Dr. Thornton does not explore what might explain why some voter records in North Carolina have social security numbers and others do not.

48. One reason that a social security number might be missing from a registered voter's record in the NCSBE database is because said individual registered to vote using a North Carolina driver's license. In North Carolina, an individual seeking to register to vote need only provide a social security number in the absence of a driver's license.[7] Therefore, missing social security numbers in the NCSBE database are not inherently problematic. What might be problematic, though, is missing social security numbers in conjunction with missing driver's license numbers.

49. There are 100 counties in North Carolina. Figure 2 plots joint social security and driver's license missingness rates by county (ranging from around five percent to almost 30 percent) against median family income in 2017 dollars.[8] Each black point in the figure represents a county, and the size of each county dot is proportional to the number of registered voters in the county. This reflects the fact that larger dots are more meaningful statistically. Figure 2 includes a superimposed smoothing curve to aid visual interpretation (the curve is weighted by number of registered voters per county).

50. The pattern in Figure 2 is unmistakable: joint social security and driver's license number missingness in North Carolina is systematic and, the poorer a North Carolina county as measured by median family income, the greater the extent that its voter records lack these

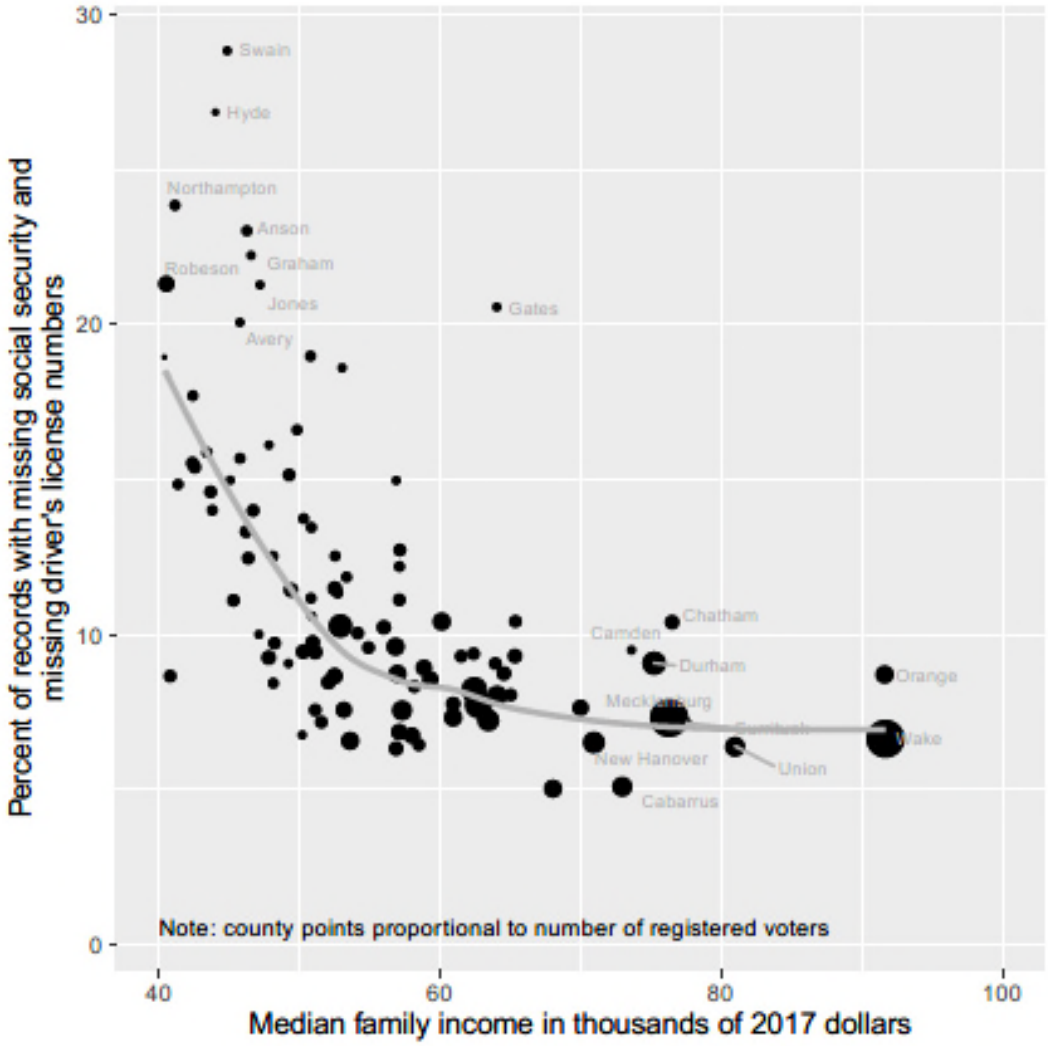
[7] *See, e.g.*, *Registering to Vote in North Carolina*, N.C. St. Bd. of Elections, https://www.ncsbe.gov/voters/registering-to-vote (last accessed Nov. 14, 2019).

[8] County median family income figures are drawn from the 2018 American Community Survey, one year estimates, Table DP03.

records. The relationship between county income and joint social security and driver's licenses number missingness is not linear; for the least well-off counties in North Carolina, missingness rates increase steeply.

51. We know from Barreto et al. (2019) that, all things being equal, low income is associated with low access to voter identification. Thus, the implication of Figure 2 is that social security and driver's license numbers are disproportionately missing in places where we would expect individuals to lack forms of voter identification. This suggests that the missingness that troubles Dr. Thornton may be a reflection of non-access to voter identification—and not necessarily a propensity for false negatives on the no-match list.

Figure 2: Social security and driver's license number missingness by county



Note: each point corresponds to a North Carolina county, and counties where median family income is at least $70,000 and counties with a missingness rate of at least 20 percent are labeled.

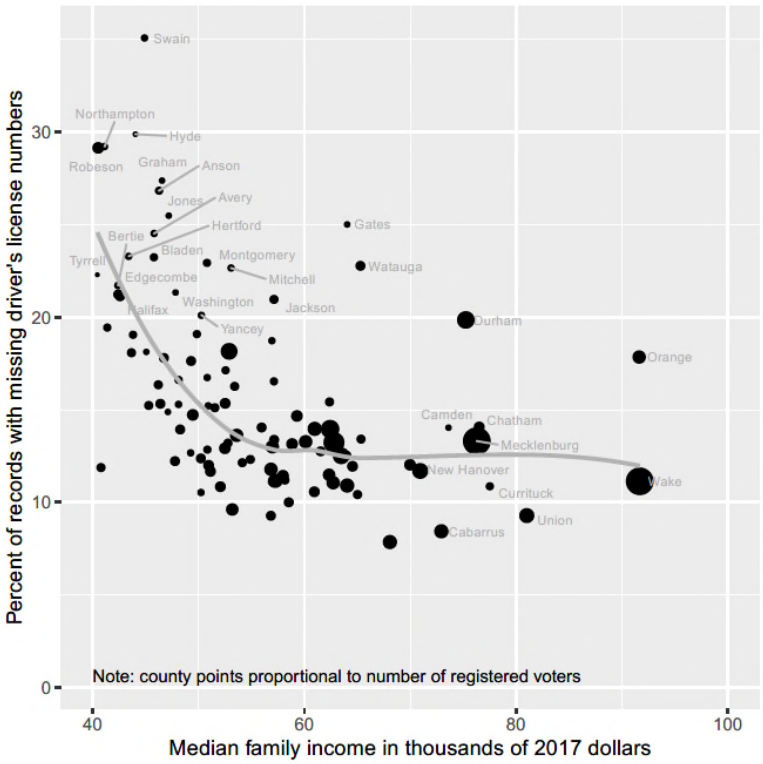
52. I have already argued that driver's license number missingness is consistent with a lack of driver's licenses and that Dr. Thornton's claim that driver's license missingness is indicative of false negatives on the no-match list is to some degree circular. In light of Barreto et al.'s aforementioned findings on the relationship between income and driver's licenses, I should thus expect to see driver's license number missingness in relatively poor counties in North Carolina, and in fact this is what is observed in Figure 3. This figure plots license number

missingness rates (the rate at which registered votes lack driver's licenses) against county median family income and shows that, the less well-off a county, the greater the number of registered voters who lack driver's license numbers in the NCSBE's database of registered voters.

Racial disparities among registered voters with and without missing data

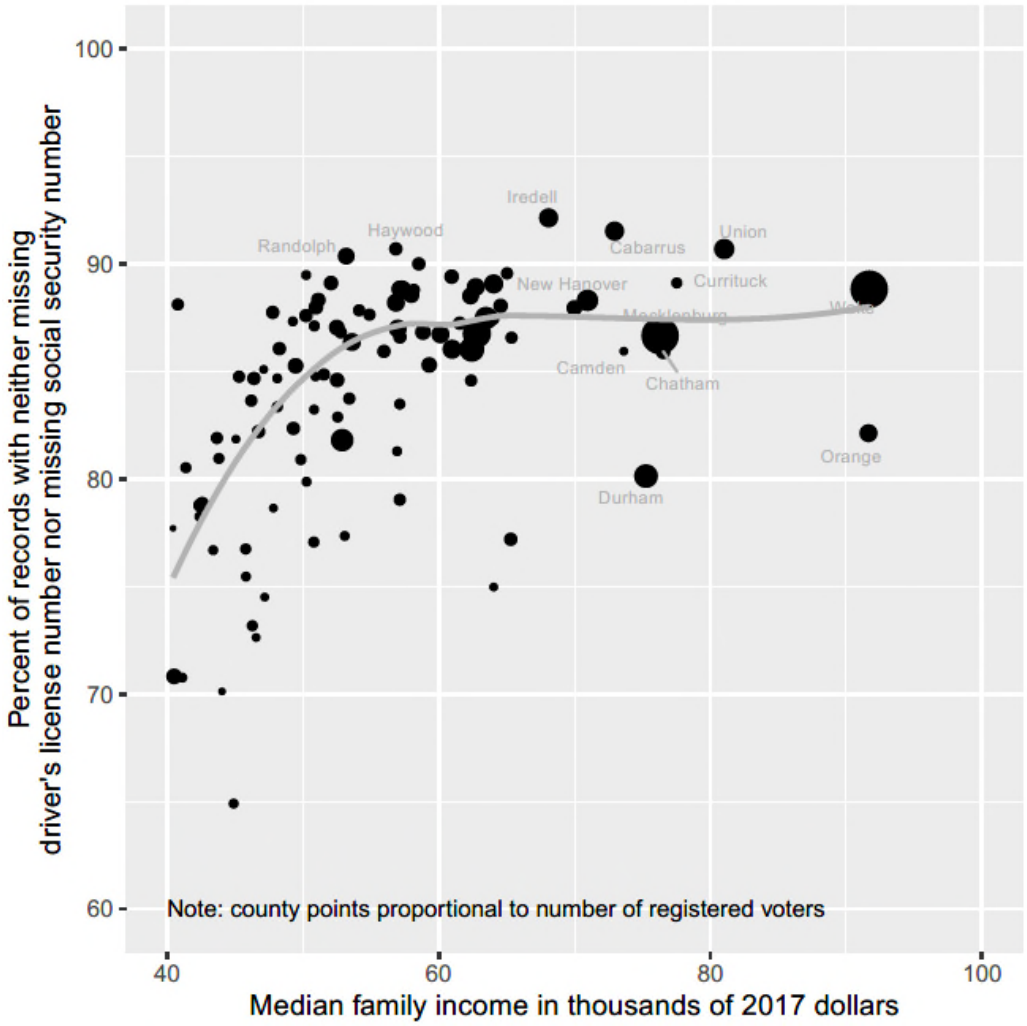
53. I have argued above that Dr. Thornton's concerns about missing data are best understood as reflecting missing driver's licenses. Nonetheless, here I consider the racial breakdown of registered voters in North Carolina who are missing neither driver's license numbers nor social security numbers. This group of individuals is disproportionately drawn from the wealthier counties in North Carolina, as shown in Figure 3.

Figure 3: Driver's license number missingness by county



Note: each point corresponds to a North Carolina county, and counties where median family income is at least $70,000 and counties with a missingness rate of at least 20 percent are labeled.

Figure 4: Lack of driver's license and social security number missingness by county



Note: each point corresponds to a North Carolina county, and counties where median family income is at least $70,000 and counties with a non-missingness rate of at least 90 percent are labeled.

54. This figure plots the extent to which a county's registered voters are missing neither driver's license nor social security numbers, i.e., the county's non-missingness rate, against its median family income. The upward slope of the smooth curve in the figure indicates that, by focusing on voter records with non-missing data, I am disproportionately focusing on

locations in North Carolina that are disproportionately non-poor.

55. Table 5 displays the no-match rates for four groups of registered voters. The top two rows are associated with registered voters who have neither a missing driver's license nor a missing social security number. Dr. Thornton would argue that the rates at which these individuals appear on the no-match list is more meaningful than the rates at which individuals with missing data appear on the no-match list (but recall that I do not agree with this characterization insofar as the argument supporting it is in part dependent on circular logic). Regardless, these individuals are disproportionately non-poor.

56. The bottom two rows of Table 2 are associated with registered voters who have either a missing driver's license or missing social security number. Dr. Thornton would argue that the rates at which these individuals appear on the no-match list is questionable but, for reasons noted above, I do not agree with this claim.

Table 5: No-match rates and missing data

Missing data	Race	Registered voters	No-match rate
None	Black	1,196,371	4.29
None	White	4,045,897	3.51
Some	Black	260,414	48.57
Some	White	489,172	40.36

57. Regardless of the missingness, however, black registered voters appear on the no-match list at greater rates than white registered voters. Conditioning on individuals who disproportionately live in counties that are not-poor (the top two rows of the table) shrinks the black-white no-match gap (4.29 percent versus 3.51 percent), but the gap persists nonetheless. Conditioning on individuals who disproportionately live in counties that are relatively poor (the

bottom two rows of the table) reveals a greater black-white gap regarding presence on the no-match list.

58. The point of Table 5 is that, even if Dr. Thornton's critique about missing data is taken at face value, it follows that blacks appear on the no-match list at a greater rate than whites. This is notable insofar as the objective of my original report was assessing the racial composition of the no-match list, and here I have done so focusing on a set of registered voters who, per Dr. Thornton, have reliable data.

Dr. Thornton proposes a matching method to remove registered voters from the no-match list weaker than the one used by the NCSBE

59. On pp. 19-21 of her report, Dr. Thornton proposes a matching method that, she asserts, can eliminate false negatives on the no-match list. Dr. Thornton motivates this method by commenting on the presence of "anomalies" in the NCSBE voter data (p. 19, paragraph 40). She writes, for example, "After reviewing the criteria and the percentages among the 617K missing the key fields, we also found anomalies in the data such as misspelled names, first names with just one initial, first names in the middle name field and the middle name in the first name field, as compared to the DMV data."

60. Dr. Thornton does not provide any numbers to support her claims about problematic name data in the NCSBE list of registered voters. I cannot ascertain from her assertion about "anomalies" in the paragraph above how often NCSBE names are truly anomalous. That said, I performed the following analysis on the complete list of registered voters.

61. First, I searched the NCSBE database for the number of registered voters whose middle names consist of one of the following strings: "JR," "SR", "II," "III," "V," or "VI." I ignored cases in my search for these strings, meaning that I treated "JR" as equivalent to "jr," among other things. If a registered voter's middle name contains one of the above strings, it is fair to conclude that the record has an error: these strings are name suffixes, not middle names.

62. Of the 6,713,011 voter records used by Dr. Thornton in her report, 5,178 (approximately 0.077 percent) have such a middle name error. The fact that any voter records have this error is regrettable, but the frequency of this error in the NCSBE database is very low.

63. Second, I searched for the number of registered voters that have both one-letter first names or one letter last names. Voter records like this probably reflect errors, but it is worth pointing out that some individuals go by their middle names and use an initial as a first name, e.g., H. Ross Perot.

64. Of the 6,713,011 voter records used by Dr. Thornton in her report, 4,405 (approximately 0.066 percent) have either a one letter first name or a one letter last name. Assuming that all of these represent database errors is conservative, but it is nonetheless the case that the frequency of one letter name errors in the NCSBE database is very low.

65. For black and white registered voters, I computed the percentage of individuals on the no-match list disregarding all individuals who have either a middle name error or a one letter first or last name, as described above. Consistent with Dr. Thornton's argument, ignoring these individuals means that I am conditioning on, or focusing attention on, registered voters with more accurate data. Doing this yields a black-white no-match list gap of 4.8 percentage points. Put another way, when I remove from consideration registered North Carolina voters

whose names fields contain errors in the way described by Dr. Thornton, the finding that the no-match list is disproportionately black remains.

66. Based on the rare name field errors sketched above, Dr. Thornton describes her attempts to remove from the no-match list the records that she believes might be false negatives. Briefly, Dr. Thornton looks for unique records in data maintained by the North Carolina DMV and then checks to see if any of the unique DMV records that she locates can be matched with individuals in the no-match list. Any individual on the no-match list who is matched with a unique DMV record is, according to Dr. Thornton's algorithm, removed from the no-match list. Uniqueness on the DMV list is based on the data fields described on p. 20 of the Thornton report, and Dr. Thornton's procedure is described on paragraph 42 of her report.

67. There are two notable limitations with Dr. Thornton's approach to eliminating names from the no-match list.

68. First, the data fields used in her DMV to NCSBE database matching exercise are weaker than the data fields used by the NCSBE that Dr. Thornton herself criticizes in her report. By weaker I mean, less specific than the fields criticized by Dr. Thornton. For example, one criterion in Dr. Thorn-ton's approach to removing names from the no-match list is "Birth date and first name." According to Dr. Thornton's method, if a unique record in the DMV database matches to a record in the no-match list based on birth date and first name, Dr. Thornton considers this result a match and thus evidence of a false negative on the no-match list. The NCSBE used no criteria as weak as birth date and first name when it created the no-match list in the first place.

69. If, as Dr. Thornton argues in her report, the NCSBE's nine matching criteria (*see* her Table 1 on p. 8) lead to an over-inclusive no-match list, then her five relatively weaker

criteria (*see* the bulleted list on p. 20, the second element of which is "Birth date and first name") are even more prone to over-inclusivity. This is not because five is less than nine. It is because the five criteria Dr. Thornton uses do not require as much field similarity as the nine criteria used by the NCSBE. If an algorithm designed to remove false negatives from the no-match list is over-inclusive, it risks removing ostensibly false negatives that are actually true negatives.

70. Second, and on account of the weakness in her matching criteria, the algorithm devised by Dr. Thornton should be checking for uniqueness not just in its source database (the DMV database) but also in the algorithm's target, which consists of the entire NCSBE registered voter database. Based on what Dr. Thornton wrote on p. 20, paragraph 42, of her report, if a unique DMV record matches to a record on the no-match list *and* to at least one registered voter who is not on the no-match list, then Dr. Thornton removes the former record from the no-match list.

71. Dr. Thornton argues that her procedure is under-inclusive because it requires matches to have unique fields in the DMV database. While requiring uniqueness in this way is laudable, by not requiring uniqueness in her target database, the NCSBE set of registered voters, Dr. Thornton's procedure is over-inclusive. I cannot opine as to whether the asserted under-inclusiveness of Dr. Thornton's procedure dominates what I have argued is over-inclusiveness, or vice versa.

72. The result of applying Dr. Thornton's algorithm to the no-match list is a set of registered voters who have not been removed from this list. From Dr. Thornton's report, I believe that this set of individuals has approximately 158,000 voters on it (*see* p. 21, paragraph

46, of the report). I do not have this list of registered voters and thus cannot characterize its racial or ethnic composition.

73. Dr. Thornton refers in her report (also paragraph 46) to a second list of approximately 72 thousand registered voters. It is not clear from Dr. Thornton's report how she derived this latter list of voters. It is possible that this list of 72 thousand registered voters consists of individuals who were not removed from the no-match list by Dr. Thornton's algorithm. I do not have the 72 thousand person list of registered voters and thus cannot characterize its racial or ethnic composition.

The NCSBE attempted to contact all individuals on the no-match list and in response has heard from a minuscule number of individuals that their placements on the no-match list is erroneous

74. The NCSBE has stated that the algorithm behind the creation of the no-match list was purposefully designed to be overinclusive in the sense of including all registered North Carolina voters on the list who possibly may lack a DMV-form of identification. This was confirmed in the "AFFIDAVIT OF KAREN BRINSON BELL." Ms. Bell is presently the Executive Director of the NCSBE and has been as of June 1, 2019.

75. Throughout her report, Dr. Thornton is critical of the no-match list for the extent to which it is allegedly overinclusive. And in this report, I have noted that all database matching exercises are subject to false negatives (i.e., including individuals on a no-match list who do have DMV-forms of identification) and false positives (i.e., not including individuals who do not have such forms of identification).

76. In September 2019, the NCSBE sent a mailing to all individuals on the no-match list. According to Ms. Bell, "[This] mailing was delivered to approximately 700,000 individuals

throughout [North Carolina]" (p. 7, paragraph 20). This mailing states to its recipients that, "**The NCSBE has identified you as a voter who may not have an unexpired NC driver's license or non-operator ID issued by the Division of Motor Vehicles**" (bold in original, shown in Exhibit K of the Bell Affidavit).

77. The Bell Affidavit notes that, as of October 21, 2019, the NCSBE has received responses from 173 of the 617,029 registered voters on the no-match list (p. 7, paragraph 22). 173 is a minuscule fraction of the entire no-match list. The Bell Affidavit reports that many of the 173 recipients of the NCSBE's mailing have reported that they do indeed have a valid form of identification for voting; some have reported that they are "no longer North Carolina voters," which may indicate that they have moved away from the state; and, some have reported that the mailing was addressed to a deceased person.

78. The small number of responses (173) to the NCSBE mailing is evidence that the algorithm that created that no-match list incorrectly identified a very small number of individuals as lacking DMV identification. While this set of individuals is an example of over inclusiveness, the ratio of 173 to 617,029 is tiny.

79. Since the NCSBE's mailing was sent only to individuals on the no-match list, it cannot address the possibility that the algorithm behind the no-match list has committed some false positives as well as the 173 documented false negative results.

Conclusion

80. In this rebuttal I have engaged the critiques that Dr. Thornton made in response to my preliminary expert report in this litigation. The objective of my report was to assess the racial and ethnic composition of the North Carolina State Board of Elections' no-match list and

in particular to assess whether registered voters who are black or Hispanic appear on the no-match list at similar, or different, rates than their racial or ethnic majority counterparts.

81. My original report shows that registered voters on the no-match list are disproportionately black and Hispanic compared to the registered voter pool in North Carolina. In her report, Dr. Thornton has not disputed this.

82. Motivated by Dr. Thornton's stated concerns about the accuracy of the no-match list, I have examined a variety of subsets of this list. In my analyses of these subsets, I find results that parallel my original report's findings. When in response to Dr. Thornton I slice the no-match list in various ways, I find the same thing: over-representation of blacks and Hispanics among registered voters in North Carolina whose names appear on the no-match list.

References

Matt A. Barreto, Stephen Nuño, Gabriel R. Sanchez & Hannah L. Walker, *The Racial Implications of Voter Identification Laws in America*, 47(2) American Politics Research 238, 238–49.

I declare under penalty of perjury that the foregoing is true and correct.

Respectfully submitted,

Executed on: 5/17/2024

Michael C. Herron