EXHIBIT D

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ALABAMA SOUTHERN DIVISION

STATE OF ALABAMA, et al., Plaintiffs, v. UNITED STATES DEPARTMENT OF COMMERCE, et al., Defendants, and DIANA MARTINEZ, et al., Defendant-Intervenors, COUNTY OF SANTA CLARA, CALIFORNIA, et al., Defendant-Intervenors, and STATE OF NEW YORK, et al., Defendant-Intervenors.	Civil Action No. 2:18-cv-00772-RDP

SWORN DECLARATION AND REBUTTAL EXPERT REPORT OF D. SUNSHINE HILLYGUS

INTRODUCTION

My name is D. Sunshine Hillygus, Ph.D. I am professor of political science and director of the Initiative on Survey Methodology at Duke University.

I have been retained as an expert witness by the State and other Government Intervenors, Local Government Intervenors, and the Martinez Intervenors in the above-captioned case. I previously submitted an expert report in this case evaluating (1) the analysis of Plaintiffs' expert witness, Dr. Dudley Poston, which predicted that the State of Alabama would receive six congressional seats in the U.S. House of Representatives if undocumented immigrants were included in the 2020 apportionment count and seven seats if they were excluded, and (2) the feasibility of excluding undocumented immigrants from the 2020 apportionment count. My qualifications are summarized in my initial report, (*see* **Exhibit A** ("Hillygus Report") at 1-2), and in my attached CV (*see* **Exhibit B)**.

In my previous report, I reached the following conclusions: *First*, Dr. Poston did not demonstrate, to any degree of reasonable certainty, that Alabama will (a) lose a House seat because of the inclusion of undocumented immigrants in the 2020 apportionment count, or (b) maintain a House seat because of the exclusion of undocumented immigrants in the 2020 apportionment count. *Second*, there is no reliable way to exclude undocumented immigrants from the 2020 apportionment count because (a) there is currently no reliable methodology or data product that the Census Bureau may use to do so; (b) no administrative records are of sufficient quality to use to exclude undocumented immigrants from the 2020 apportionment count; and (c) the nature, scope, and methodology of the statistical modeling needed to produce estimates of the undocumented population is fundamentally different from the statistical modeling currently used in producing the apportionment population, and would result in a less accurate and reliable enumeration.

Since submitting my initial report, I have reviewed Dr. Poston's rebuttal report and his second supplemental report and the data used in the analyses he performed in connection with those reports. Both of my conclusions still hold. Dr. Poston's analysis and conclusions are based on contrived and speculative population estimates that are an unreliable basis to predict the actual Census count as of Census Day, April 1, 2020, or to apportion House seats based on that count. For the reasons explained in my initial report and below, Dr. Poston's analyses significantly overestimate the number of undocumented immigrants who can be accurately and reliably enumerated in each state on Census Day. Dr. Poston's secondary conclusion that Alabama will maintain seven House seats if only a fraction of undocumented immigrants are excluded is not reliable because he relies on speculative and artificial estimates of the number of undocumented immigrants who can be accurately and reliably enumerated in a state on April 1, 2020.

In my analysis, I show that it is plausible that Alabama could retain seven House seats even if undocumented immigrants are included in the apportionment population, demonstrating the significant uncertainty in Dr. Poston's state population estimates. I also show that excluding undocumented immigrants from the 2020 apportionment population using administrative records could have no impact on Alabama's retention or loss of a House seat, demonstrating the highly-

speculative analysis that Alabama will retain its seventh House seat if undocumented immigrants, or some fraction of undocumented immigrants, are excluded from the 2020 Census apportionment count.

I am being compensated at a rate of $350/hour for my actual time spent on this case. My compensation does not depend on the outcome of this litigation, the opinions I express, or the testimony I provide.

DISCUSSION

I. Poston does not demonstrate, with any reasonable degree of certainty, that Alabama will lose a seat if undocumented immigrants are included in the apportionment population.

In his second supplemental expert report, Dr. Poston updates his analysis using the Census Bureau's 2020 population estimates. (*See* **Exhibit C** (**"**Poston Second Suppl. Report") at 3). In contrast to his initial analysis, Dr. Poston (1) subtracts a quarter of the year's growth or loss to produce hypothetical estimates of the resident population of each state on April 1, 2020 (hereinafter the "April 1, 2020 Adjustment") (instead of July 1, 2020), and (2) does not include estimates of the overseas population. (*Id.* at 3-4). These estimates are not reliable projections of the 2020 decennial census count that will be used for apportionment.

As discussed in my previous report (*see* Hillygus Report, at 9-11), population estimates often diverge significantly and in ways that vary across states from final decennial population counts.[1] The apportionment formula is sensitive to small changes in population, so differences between decennial counts and population estimates are often sufficient to change the projected distribution of seats.[2] Alabama is on the cusp of having priority to maintain its seventh House seat, so even small differences in population estimates attributable to a variety of factors can change the outcome. For example, if we use the Census Bureau's 2020 population estimates without Poston's April 1, 2020 Adjustment—consistent with the approach Poston took in his initial expert report (*See* **Exhibit D** ("Poston Report") at 14; *see also* **Exhibit E** ("Poston Suppl. Report"))—the method of equal proportions results in Alabama retaining seven House seats (*see* Table A1, Column C), which contradicts Dr. Poston's conclusion that Alabama will receive only six seats if undocumented immigrants are included. I present this alternative calculation not to predict the likelihood that Alabama will retain a seventh seat but rather to demonstrate that Dr. Poston's estimates are unreliable and the formula is sensitive to very small changes in population estimates. Alabama's estimated population differs by just 3,392 persons between the Census Bureau's 2020 population estimates and Poston's April 1, 2020 Adjustment. This illustrates

[1] The Census Bureau emphasizes that population estimates are for *research* purposes, whereas the decennial count will be used for apportionment. https://www.census.gov/newsroom/press-releases/2020/estimates-population-housing-units.html.

[2] The average absolute difference between the final total resident population estimates and 2010 Census counts was about 3.1 percent across all counties, although there were some geographic areas that had larger and smaller variation between the population estimate and the decennial. *See* U.S. Census Bureau, Methodology for The United States Population Estimates: Vintage 2020. https://www2.census.gov/programs-surveys/popest/technical-documentation/methodology/2010-2020/methods-statement-v2020-final.pdf.

why, under these circumstances in which Alabama is on the cusp of retaining or losing a seat, Poston cannot accurately predict with any degree of certainty whether Alabama will ultimately lose a seat during the apportionment process.

Moreover, the key assumption underlying Dr. Poston's April 1, 2020 Adjustment—that each state had a constant rate of population growth or loss from July 2019 until July 2020 (Poston Second Suppl. Report at 4)—is flawed given the uneven effects of the COVID-19 pandemic on state populations. At minimum, the COVID-19 pandemic increases uncertainty about the final decennial counts because of changes on residential mobility patterns and mortality rates. In fact, many of the population patterns from the pandemic suggest an *increased* likelihood that Alabama will retain seven House seats once the actual population enumeration is known.[3] For example, data from national moving companies indicate that Americans moved less in 2020 than earlier trends would have predicted—and were dramatically less likely to move in April, May, and June of 2020—undermining Poston's assumption of a constant rate of population change.[4] Among those who moved during the pandemic, it was more often *out of* states like the State of New York—one of the states closest in priority to Alabama[5]—as people fled urban areas for less dense communities.[6] Likewise, millions of college students were displaced when their colleges were shuttered just as census operations were getting under way, disproportionately impacting states with large college student populations. By way of comparison, 269,344 out-of-students are enrolled in Alabama colleges, compared to 1.1 million out-of-state students in New York colleges.[7] Finally, deaths from COVID-19 varied across states and time. Alabama experienced many fewer COVID-19 deaths prior to Census Day than New York and other states before April 1, 2020: Alabama experienced 48 COVID-19 deaths by that date compared to 2,864 in New York.[8] New York then experienced an additional 28,766 COVID-19 deaths in April, May, and June 2020—individuals who will be included in the decennial census count, but excluded from the July 2020 Census Bureau population estimates—again challenging Poston's assumption underlying his April 1, 2020 Adjustment of constant population growth.

Further underscoring the unreliability of his population estimates, Dr. Poston omits entirely from his updated analysis an estimate of the overseas population that will be part of the apportionment count. (Poston Second Suppl. Report at 4). Dr. Poston notes that he does not use

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[3] https://www.al.com/news/2019/12/alabama-counts-how-one-republican-state-bucks-national-trends-and-boosts-census-awareness.html; https://www.censushardtocountmaps2020.us/.

[4] United Van Lines ranked Alabama as #8 for in-bound moves in 2020. *See* United Van lines (2021). https://www.unitedvanlines.com/newsroom/movers-study-2020 and HireAHelper's COVID Moving Study (2021). https://www.hireahelper.com/moving-statistics/covid-migration-report.

[5] Election Data Services. New Population Estimates Point to Significant Issues in Recent Supreme Court Case (Dec. 22, 2020). https://www.electiondataservices.com/wp-content/uploads/2020/12/NR_Appor20wTableMaps.pdf.

[6] https://www.hireahelper.com/moving-statistics/covid-migration-report.

[7] Calculated based on the reported percentage of in-state residents enrolled in state and total number of students enrolled. https://educationdata.org/college-enrollment-statistics#college-enrollment-statistics.

[8] https://www.cdc.gov/nchs/nvss/vsrr/covid19/index.htm.

"the best 2020 estimates of the overseas count" because data for 2020 are not available. (*Id.*).[9] In 2010, the overseas population added 23,246 additional individuals to Alabama's apportionment population.[10] As I have previously explained (*see* Hillygus Report at 10-11), uncertainty about the overseas population is one reason that Poston's estimates are unreliable, but Poston's assumption in his updated analysis that the population is zero is also implausible. Given Alabama is on the cusp of retaining or losing a seat, the overseas population could be consequential to the outcome. For example, if we replicate the approach Dr. Poston used to estimate the overseas population in his initial report (*see* Poston Report at 14), adding these estimates to his April 2020 population estimates, the method of equal proportions projects that Alabama would retain seven congressional seats. (*See* Table A1, Column I). Likewise, even when we reduce the estimated size of the 2020 overseas population in a state by the amount noted in Dr. Poston's reporting of the DOD's Manpower Data Center data, Alabama still retains 7 congressional seats. (*See* Table A1, Column K).[11] Because overseas residents will be included in the Census Bureau's final apportionment counts, Dr. Poston's omission of those residents from his analysis makes his conclusion that Alabama will lose a House seat unreliable.

Based on these alternative analyses, it is my expert opinion that there is a reasonable likelihood that Alabama will retain seven seats even with the inclusion of undocumented individuals in the apportionment count, and that Alabama's potential loss of a House seat is purely speculative at this time. To be clear, I am not endorsing a particular set of population estimates; rather, my expert opinion is that Dr. Poston's estimates are based on flawed assumptions and, in any event, yield highly speculative conclusions about the potential effect on Alabama of including undocumented persons in the apportionment count. Given the sensitivity of the apportionment formula and the uncertainty of the final apportionment counts, we cannot know if Alabama will receive six or seven congressional seats until the decennial enumeration has been completed.

II. Poston does not demonstrate, with any reasonable degree of certainty, that Alabama will maintain seven House seats if undocumented immigrants are excluded from the 2020 apportionment count.

To estimate the apportionment population excluding undocumented immigrants, Dr. Poston relies on the 2018 estimate of the undocumented immigrant population from the Center for Migration Studies (CMS), which he adjusts to 2020 assuming a constant proportion as in 2018.[12] This data source is a change from his earlier reports that had relied on data from the Pew Research Center. (Poston Report at 15-16). CMS and Pew vary somewhat in their state-level

[9] This is a somewhat puzzling argument given the absence of 2020 data about the decennial count and undocumented immigrants did not prevent Poston from making hypothetical apportionment projections.

[10] https://www.census.gov/data/tables/2010/dec/2010-apportionment-data.html.

[11] According to Poston's Report (p. 4-5), there were just 51% of DOD personnel overseas in March 2020 compared to September 2010 (229,843 v. 449,952).

[12] Robert Warren. "Reverse Migration to Mexico Led to US Undocumented Population Decline: 2010 to 2018." *Journal on Migration and Human Security* 8, no. 1 (2020): 32-41.

estimates and underlying assumptions[13]—again highlighting the contingent nature of Dr. Poston's estimates—but both rely on the residual method. The residual method starts with an estimate of the foreign-born population estimate from the American Community Survey and then subtracts an estimate of the number of foreign born persons with lawful residence in the United States. The CMS estimates suffer from the same basic data deficiencies, limitations, and uncertainties inherent in the residual method and the underlying data components as outlined in my previous report. (*See* Hillygus Report at 12-26). Rather than rehash those detailed criticisms, let me just reiterate the irrefutable issue: estimates of undocumented immigrants from the residual method are not a direct enumeration—they are estimates from statistical modeling of data subject to significant sampling and nonsampling errors, which render any resulting projections too imprecise and unreliable for purposes of apportionment.[14]

In his rebuttal, Poston admits these are "valid criticisms," but says they are "unavoidable issues." (*See* **Exhibit F** ("Poston Rebuttal Report") at 3). Poston defends his use of flawed data with "unavoidable issues" because they are the "best available" estimates of undocumented immigrant population.[15] Without conceding that Dr. Poston's estimates are the "best available," even if they were, "best available" may still be unreliable or not fit for use for apportionment purposes. Given the prohibition on the use of statistical sampling, the constitutional requirement for an "actual enumeration," and the absence of an existing Census Bureau data product that includes immigration status, administrative records would need to be used to produce 2020 apportionment counts that omit undocumented immigrants. (*See* Hillygus Report at 27-29). There are, however, very few administrative records available to the Census Bureau that document those with undocumented status. As discussed in detail in my previous report, the available administrative records that do exist are often incomplete, outdated, and error-prone. (Hillygus Report at 29-40). Moreover, to be used for apportionment, those administrative records must be successfully matched to a census record. The exact number of undocumented immigrants who can be identified with administrative records remains unknown—in early January 2021, the Census Bureau stopped efforts to implement President Trump's Executive Order 13880[16] and President Trump's Presidential Memorandum on Excluding Illegal Aliens from the Apportionment Base Following the 2020 Census[17] directing the Bureau to use

[13] For example, in their 2016 estimates, New York is estimated to have 77,000 more undocumented immigrants in the CMS estimates than in the Pew estimates. *See* https://www.pewresearch.org/hispanic/2018/11/27/unauthorized-immigration-estimate-appendix-b-additional-maps/ and https://cmsny.org/publications/warren-undocumented-2016/.

[14] Data quality can be defined as "fitness for use," so it is important to emphasize that my report evaluates the quality of the residual method with respect to apportionment, which requires a "direct enumeration." These data could be considered of sufficient quality for many other purposes, such as social scientific research.

[15] Poston appears to misunderstand statistical and measurement uncertainty. In his rebuttal, he states that by acknowledging the assumptions he used in calculating his projections, he is acknowledging his projections are uncertain. (Poston Rebuttal Report at 14-16). While it is important to acknowledge assumptions, that is not the same thing as calculating the error or bias in the resulting projections. As noted in my initial report (Hillygus Report at 17-19), some uncertainty can be easily quantified (e.g., margin of error from random sampling error), but other sources of error (e.g., measurement error) introduce systematic biases that should be evaluated.

[16] 84 Fed. Reg. 33,821 (July 16, 2019).

[17] 85 Fed. Reg. 44,679 (July 23, 2020).

administrative records to identify the count of undocumented immigrants in each state.[18] It is clear, however, the estimates of the undocumented immigrant population from the residual method bear little resemblance to the number of undocumented immigrants who can be reliably and accurately directly enumerated in each state on April 1, 2020.

In his second supplemental report, Dr. Poston applies the method of equal proportions to population estimates that exclude 100%, 50%, 25%, and 10% of the estimated number of undocumented immigrants from the residual method in each state—presumably in recognition of the impossibility of identifying and matching *all* undocumented immigrants in administrative records. (Poston Second Suppl. Report at 7-8). Dr. Poston's analysis is contrived and unconvincing. First, he provides no explanation or justification for the specific percentages used in his analysis, merely highlighting the speculative nature of his estimates. Second, it is implausible that the percentage of undocumented immigrants who can be identified in administrative records will be equally proportional to the CMS estimates across all 50 states, and such variation could impact the number of seats Alabama is allocated given the zero-sum apportionment formula. Third, I demonstrate that Alabama's potential retention or loss of its seventh House seat if undocumented immigrants enumerated through administrative records are excluded from the apportionment population is highly speculative.

I consider the administrative records for the subgroup thought to be most feasibly excluded from apportionment numbers: those housed in ICE detention facilities. ICE detainees have been identified as one possible group to exclude based on administrative records from the apportionment count by the government in *Trump v. New York.*[19] Administrative records about those housed in a detention facility on Census Day may reliably be matched to the decennial count through the group quarters enumeration records, whereas other administrative records—e.g., non-detained immigrants who have received a final order of removal—can be especially difficult to match to a census record.[20] Looking at the most recent ICE detention numbers (July 2019), the detained population represents anywhere from 0% (in states with no detention facilities) to 12% of the CMS undocumented population estimate (Table A1, Col. M)—illustrating the arbitrary nature of Dr. Poston's exercise assuming states will have an equal percentage (50%, 25% or 10%) of the CMS estimate excluded. Moreover, contrary to Dr.

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[18] Hansi Lo Wang. January 13, 2021 Census Bureau Stops Work on Trump's Request For Unauthorized Immigrant Count. NPR. https://www.npr.org/2021/01/13/956352495/census-bureau-stops-work-on-trumps-request-for-unauthorized-immigrant-count

[19] E.g., Madiba Dennie and Thomas Wolf. Supreme Court Takes Wait-and-See Approach to Trump's Anti-Immigrant Census Policy. Brennan Center for Justice (December 18, 2020). https://www.brennancenter.org/our-work/analysis-opinion/supreme-court-takes-wait-and-see-approach-trumps-anti-immigrant-census. *Trump v. New York*, 20-366 December 18, 2020, p. 5. https://www.supremecourt.gov/opinions/20pdf/20-366_7647.pdf

[20] Although ICE also has administrative records for their non-detained docket, that information is often outdated and inaccurate, especially with respect to the individual's geographic location. The non-detained docket also includes individuals who have died or left the country. Given the backlog in the immigration courts, individuals increasingly choose to leave the country without applying for agreeing to a formal "voluntary departure," which requires approval by an immigration judge. It is also the case that a greater percentage of those on the non-detained docket are granted permission to stay in the country—since 2001, more than 40% of cases ended with termination, a grant of relief, or administrative closure. *See* TRAC Immigration. State and County Details on Deportation Proceedings in Immigration Court. https://trac.syr.edu/phptools/immigration/nta/.

Poston's conclusions, excluding these ICE detainees from the 2020 apportionment population estimates will likely not impact Alabama's retention or loss of a House seat. This is true whether using the Census Bureau's 2020 estimates (Table A1, Col. E. v. Col. O) or Poston's April 2020 Adjustment (Table A1, Col. C v. Col. Q).[21] Thus, Poston's conclusion that excluding undocumented immigrants from the 2020 apportionment count will cause Alabama to retain a seventh House seat is unreliable and highly speculative.

While those located in ICE detention centers may offer a more reasonable estimate of the subset of undocumented immigrants who can be accurately and reliably identified by administrative records and matched to a 2020 census record, I want to emphasize that residing in an ICE detention facility indicates only that a person is ***potentially*** unlawfully present in the United States; it is not itself a determination of immigration status. It is well-documented that detainees can include American citizens, legal permanent residents, and individuals who are eventually granted refugee status or other relief from deportation. For example, ICE released more than 1,480 detainees between 2012 and 2018 based on investigations of citizenship claims—more than 20% of the total claims reviewed by the agency.[22] According to TRAC Immigration Project's compilation of deportation proceeding outcomes, 27.8% of removal proceedings in 2019 resulted in the immigration court granting the individual permission to stay in the country, including 23,837 cases (roughly 10% of all cases) in 2019 in which an immigration court judge simply terminated a case, finding no grounds for removal.[23]

The broader issue is the inherent difficulty of categorizing some individuals as discretely "legal" or "illegal."[24] Immigration status is complex and fluid, sometimes changing multiple times

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[21] Although I don't have the number of detainees in a state as of April 1, 2020, it is worth noting that it was likely much smaller than the July 2019 estimates. ICE reports that the detained population has steadily dropped since March 1, 2020 in response to the COVID pandemic, with the detained population as of February 5, 2021 only 13,860 compared to an average daily population of 50,165 in FY2019. *See* https://www.ice.gov/coronavirus.

[22] Paige St. John and Joel Rubin. ICE held an American man in custody for 1,273 days. He's not the only one who had to prove his citizenship. *Los Angeles Times.* April 27, 2018. https://www.latimes.com/local/lanow/la-me-citizens-ice-20180427-htmlstory.html. *See also* David Bier. U.S. Citizens Targeted by ICE: U.S. Citizens Targeted by Immigration and Customs Enforcement in Texas. *Cato Immigration Research and Policy Brief* No. 8 (August 29, 2018). https://www.cato.org/publications/immigration-research-policy-brief/us-citizens-targeted-ice-us-citizens-targeted. Stevens, Jacqueline. "US Government unlawfully detaining and deporting US citizens as aliens." *Va. J. Soc. Pol'y & L*. 18 (2010): 606. For examples of specific cases, *See* Darlena Cunha. ICE Is Dangerously Inaccurate: Even American citizens are not immune from immigration raids. *New York Times*. July 12, 2019. https://www.nytimes.com/2019/07/12/opinion/ice-raids.html; Eyder Peralta. You Say You're An American, But What If You Had To Prove It Or Be Deported? *NPR.* December 22, 2016. https://www.npr.org/sections/thetwo-way/2016/12/22/504031635/you-say-you-re-an-american-but-what-if-you-had-to-prove-it-or-be-deported#foot2.

[23] TRAC Immigration. Outcomes of Deportation Proceedings in Immigration Court. Syracuse University. https://trac.syr.edu/phptools/immigration/court_backlog/deport_outcome_charge.php. Another 11,093 individuals received an administrative closure of the case, such as the individual receiving temporary protected status, and 34,163 cases were granted relief from removal.

[24] Since March 2020, there has been a dramatic decline in immigration court completions because of COVID-19. Case completions dropped from about 42,000 per month to under 27,000 in March, and fewer than 7,000 per month in April, May, June, and July. This means that thousands of individuals who would have otherwise received a determination allowing them to legally reside in the United States in time for enumeration in the 2020 census would

over the course of a lifetime, sometimes even without the knowledge of the individual.[25] The Department of Homeland Security and Department of Justice acknowledge the difficulty of determining immigration status, even for those in federal custody; in their latest *Alien Incarceration Report* roughly one-third of the "known and suspected [undocumented immigrants] in DOJ custody" still had their immigration status under investigation.[26] In response to a high-profile case in which a U.S. citizen was wrongfully detained, the head of ICE's Enforcement and Removal Operations, Matthew Albence, acknowledged this complexity:

> [I]t is ICE policy to carefully and expeditiously investigate and analyze the potential U.S. citizenship of individuals encountered by ICE, including those who make a claim to citizenship, as well as in cases in which certain indicia of potential U.S. citizenship are present…. These investigations may require in-depth research of electronic and paper records, in addition to personal interviews of the individual and other persons…. ***ICE does not make the ultimate determination regarding whether an individual is a U.S. citizen***. If an individual encountered by ICE claims to be a U.S. citizen, or if ICE identifies indicia of potential U.S. citizenship, ICE will analyze the facts to determine if there is probative evidence that supports the claim. Importantly, U.S. citizenship determinations are made by U.S. Citizenship and Immigration Services, the U.S. Department of State, and the federal district courts.[27]

If determination of undocumented status is difficult for ICE, the Census Bureau cannot be expected to make a determination based on incomplete and deficient administrative records.[28]

In sum, Dr. Poston's conclusions that Alabama will retain its seventh House seat if undocumented immigrants, or some fraction of undocumented immigrants, are excluded from the 2020 Census apportionment count are speculative because he relies on flawed and unreliable

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instead potentially be excluded. *See* TRAC Immigration. Immigration Court Completions Remain at Historic Lows Through July 2020. Syracuse University. https://trac.syr.edu/immigration/reports/620/.

[25] Derivative citizenship, for instance, depends on the citizenship status of parents (and even grandparents) and can involve complex factors like marital status, custody, when a parent lived in the United States, and more. As explained by ICE's Deputy Director, "In light of the complexity of U.S. citizenship and nationality law, some individuals don't even know that they are U.S. citizens until well after they are encountered by ICE." https://assets.documentcloud.org/documents/5030194/Albence-Statement.pdf.

[26] *Alien Incarceration Report*. Fiscal Year 2018, Quarter 2. April 16, 2019. https://www.justice.gov/opa/page/file/1154711/download.

[27] Written statement of Matthew Albence, the head of ICE's Enforcement and Removal Operations, to *Los Angeles Times*, available at https://assets.documentcloud.org/documents/5030194/Albence-Statement.pdf (emphasis added).

[28] This is even the case for those with final orders of removal. Final orders of removal are often made *in absentia*, so ICE may have missing or inaccurate information about where a paroled individual is located—information that is necessary if the Census Bureau were to exclude the individual from a state's apportionment count. Although ICE classifies these individuals as fugitives, a recent study found that 15% of those individuals who were ordered deported *in absentia* successfully reopened their cases and had their *in absentia* orders rescinded—highlighting the inadequacy of these sources for identifying undocumented immigrants. *See* Ingrid Eagly and Steven Shafer. Measuring In Absentia Removal in Immigration Court. *University of Pennsylvania Law Review*. 168, no. 4 (March 2020).

estimates of the number of undocumented immigrants who can be accurately and reliably identified in the 2020 census using administrative records. Existing estimates of undocumented residents—whether from Pew or CMS—are inadequate for use in adjusting the apportionment count. More generally, administrative records are not of sufficient quality to produce an accurate and reliable population count that excludes undocumented residents. Furthermore, as the above analysis regarding the exclusion of individuals housed in ICE detention centers shows, Dr. Poston's attempt to exclude a fraction of undocumented people cannot demonstrate with any degree of certainty whether Alabama would retain or lose a seat if undocumented immigrants are excluded from the 2020 apportionment count.

CONCLUSION

In my professional opinion, Dr. Poston does not demonstrate, to any degree of reasonable certainty, that Alabama will (a) lose a congressional seat because of the inclusion of undocumented immigrants in the 2020 apportionment count, or (b) maintain a congressional seat because of the exclusion of undocumented immigrants in the 2020 apportionment count. Furthermore, it is my opinion that Alabama's potential retention or loss of a seat cannot be known with certainty until the actual apportionment count is released, and that either outcome is possible regardless of the inclusion or exclusion of undocumented persons from the apportionment count.

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

Executed on February 17, 2021 at Durham, NC.

D. Sunshine Hillygus, Ph.D

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	CB 2020 est.	Seats # (CB 2020)	Poston 2020 est.	Seats # (Poston 2020)	CB 2010 Overseas Count	CB 2010 Overseas %	Poston 2020 est. + est. 2020 Overseas	Seats # (Poston 2020 + est. 2020 Overseas)	Poston 2020 est. + 51% est. 2020 Overseas	Seats # (Poston 2020 + 51% est. 2020 Overseas)	2019 ICE detainee count	ICE detainee as % of Warren est.	Poston 2020 est. minus ICE detainees	Seats # (Poston 2020 minus detainees)	CB 2020 est. minus ICE detainees	Seats # (CB 2020 minus detainees)
Alabama	4921532	7	4918140	6	23,246	0.026%	4942059	7	4930339	7	274	0.49%	4917866	6	4921258	7
Alaska	731158	1	731769	1	11,292	0.009%	743403	1	737703	1	0	0.00%	731769	1	731158	1
Arizona	7421401	10	7389012	10	20,683	0.048%	7412921	10	7401206	10	5499	2.12%	7383513	10	7415902	10
Arkansas	3030522	4	3028138	4	10,311	0.039%	3038846	4	3033599	4	6	0.01%	3028132	4	3030516	4
California	39368078	52	39385461	52	88,033	0.059%	39478531	52	39432927	52	3944	0.17%	39381517	52	39364134	52
Colorado	5807719	8	5795411	8	15,734	0.051%	5813542	8	5804658	8	1219	0.77%	5794192	8	5806500	8
Connecticut	3557006	5	3559260	5	7,531	0.066%	3566760	5	3563085	5	0	0.00%	3559260	5	3557006	5
Delaware	986809	1	984274	1	2,943	0.034%	987500	1	985919	1	0	0.00%	984274	1	986809	1
Florida	21733312	29	21672998	29	99,463	0.029%	21787653	29	21731472	29	2268	0.30%	21670730	29	21731044	29
Georgia	10710017	14	10689518	14	39,913	0.035%	10733559	14	10711979	14	3836	1.12%	10685682	14	10706181	14
Hawaii	1407006	2	1409158	2	6,561	0.030%	1415955	2	1412624	2	34	0.10%	1409124	2	1406972	2
Idaho	1826913	2	1817450	2	5,917	0.034%	1824310	2	1820949	2	14	0.04%	1817436	2	1826899	2
Illinois	12587530	17	12607402	17	33,748	0.050%	12640563	17	12624314	17	594	0.13%	12606808	17	12586936	17
Indiana	6754953	9	6748967	9	17,780	0.051%	6767474	9	6758406	9	42	0.04%	6748925	9	6754911	9
Iowa	3163561	4	3162570	4	7,432	0.054%	3170286	4	3166505	4	137	0.26%	3162433	4	3163424	4
Kansas	2913805	4	2913513	4	10,695	0.037%	2924434	4	2919083	4	102	0.13%	2913411	4	2913703	4
Kentucky	4477251	6	4476025	6	11,239	0.053%	4487618	6	4481937	6	138	0.28%	4475887	6	4477113	6
Louisiana	4645318	6	4648560	6	20,590	0.029%	4669673	6	4659328	6	7907	11.98%	4640653	6	4637411	6
Maine	1350141	2	1349048	2	4,713	0.042%	1353834	2	1351489	2	0	0.00%	1349048	2	1350141	2
Maryland	6055802	8	6055590	8	16,377	0.049%	6072767	8	6064350	8	251	0.12%	6055339	8	6055551	8
Massachusetts	6893574	9	6893901	9	12,015	0.075%	6906551	9	6900353	9	747	0.41%	6893154	9	6892827	9
Michigan	9966555	13	9971115	13	27,986	0.046%	9999349	13	9985514	13	318	0.28%	9970797	13	9966237	13
Minnesota	5657342	7	5653020	7	10,954	0.064%	5664695	7	5658974	7	466	0.54%	5652554	7	5656876	7
Mississippi	2966786	4	2969646	4	10,943	0.037%	2980598	4	2975231	4	1624	6.77%	2968022	4	2965162	4
Missouri	6151548	8	6148780	8	22,551	0.035%	6171933	8	6160588	8	137	0.27%	6148643	8	6151411	8
Montana	1080577	2	1077964	2	5,001	0.040%	1083413	2	1080743	2	2	0.10%	1077962	2	1080575	2
Nebraska	1937552	3	1936307	3	5,484	0.055%	1942121	3	1939272	3	139	0.31%	1936168	3	1937413	3
Nevada	3138259	4	3126387	4	8,881	0.045%	3136668	4	3131631	4	455	0.28%	3125932	4	3137804	4
New Hampshire	1366275	2	1364902	2	4,975	0.040%	1370060	2	1367533	2	150	2.50%	1364752	2	1366125	2
New Jersey	8882371	12	8884593	12	15,607	0.077%	8900365	12	8892636	12	1715	0.41%	8882878	12	8880656	12
New Mexico	2106319	3	2104648	3	8,094	0.037%	2112921	3	2108867	3	1212	1.89%	2103436	3	2105107	3
New York	19336776	25	19368365	26	42,953	0.061%	19411296	25	19390260	25	820	0.12%	19367545	26	19335956	25
North Carolina	10600823	14	10575963	14	30,298	0.046%	10609567	14	10593101	14	63	0.02%	10575900	14	10600760	14
North Dakota	765309	1	764913	1	3,314	0.030%	768682	1	766835	1	7	0.10%	764906	1	765302	1
Ohio	11693217	15	11694040	15	31,991	0.047%	11726468	15	11710578	15	597	0.63%	11693443	15	11692620	15
Oklahoma	3980783	5	3975756	5	13,531	0.037%	3990096	5	3983070	5	414	0.49%	3975342	5	3980369	5
Oregon	4241507	6	4235159	6	17,532	0.034%	4254540	6	4245043	6	23	0.02%	4235136	6	4241484	6
Pennsylvania	12783254	17	12787161	17	32,526	0.052%	12819904	17	12803860	17	1115	0.60%	12786046	17	12782139	17
Rhode Island	1057125	1	1057383	1	2,680	0.037%	1060075	1	1058756	1	136	0.57%	1057247	1	1056989	1
South Carolina	5218040	7	5202956	7	20,611	0.034%	5226141	7	5214780	7	30	0.04%	5202926	7	5218010	7
South Dakota	892717	1	891320	1	5,581	0.018%	897430	1	894436	1	3	0.06%	891317	1	892714	1
Tennessee	6886834	9	6872707	9	29,326	0.031%	6904466	9	6888904	9	7	0.01%	6872700	9	6886827	9
Texas	29360759	39	29267268	39	122,857	0.032%	29410263	39	29340195	39	16552	0.92%	29250716	39	29344207	39
Utah	3249879	4	3238255	4	6,880	0.058%	3246316	4	3242366	4	40	0.04%	3238215	4	3249839	4
Vermont	623347	1	623522	1	4,596	0.022%	628102	1	625858	1	1	0.03%	623521	1	623346	1
Virginia	8590563	11	8582083	11	36,712	0.030%	8621461	11	8602166	11	982	0.37%	8581101	11	8589581	11
Washington	7693612	10	7673715	10	28,829	0.035%	7706613	10	7690493	10	1319	0.49%	7672396	10	7692293	10
West Virginia	1784787	2	1787406	2	6,821	0.029%	1793986	2	1790762	2	0	0.00%	1787406	2	1784787	2
Wisconsin	5832655	8	5830637	8	11,244	0.071%	5842165	8	5836516	8	305	0.42%	5830332	8	5832350	8
Wyoming	582328	1	581775	1	4,674	0.021%	586600	1	584235	1	0	0.00%	581775	1	582328	1

Notes: Most recent ICE detainees (July 2019): https://trac.syr.edu/phptools/immigration/detention/;
Seat Calculator: https://isr.umich.edu/apportionment-calculator-for-us-census/

LIST OF EXHIBITS

Ex. A – Sworn Declaration and Expert Report of D. Sunshine Hillygus (March 13, 2020)

Ex. B – CV of D. Sunshine Hillygus

Ex. C – Sworn Declaration and Second Supplemental Expert Report of Dudley L. Poston, Jr., Ph.D. (Feb. 4, 2021)

Ex. D – Sworn Declaration and Expert Report of Dudley L. Poston, Jr., Ph.D. (Jan. 23, 2020)

Ex. E – Supplement to Sworn Declaration and Expert Report of Dudley L. Poston, Jr., Ph.D. (Jan. 28, 2020)

Ex. F – Sworn Declaration and Rebuttal Expert Report of Dudley L. Poston, Jr., Ph.D. (Apr. 13, 2020)

EXHIBIT A

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ALABAMA SOUTHERN DIVISION

STATE OF ALABAMA, et al., Plaintiffs, v. UNITED STATES DEPARTMENT OF COMMERCE, et al., Defendants, and DIANA MARTINEZ, et al., Defendant-Intervenors, COUNTY OF SANTA CLARA, CALIFORNIA, et al., Defendant-Intervenors, and STATE OF NEW YORK, et al., Defendant-Intervenors.	Civil Action No. 2:18-cv-00772-RDP

SWORN DECLARATION AND EXPERT REPORT OF D. SUNSHINE HILLYGUS

Sworn Declaration and Expert Report of D. Sunshine Hillygus

I. Qualifications

I am a Professor of Political Science and Public Policy at Duke University. I earned a Ph.D. in political science from Stanford University in 2003. From 2003-2009, I was a faculty member at Harvard University in the Department of Government. In 2009, I joined the faculty at Duke University as an associate professor and was promoted to full professor in 2015.

I have more than 20 years of experience in survey design, implementation, and analysis. Of relevance to this report, I have published research on the topics of census participation, survey methodology, survey non-response, and data quality. This work has been funded by the National Science Foundation and published in respected academic journals including *Public Opinion Quarterly*, *Journal of Survey Statistics and Methodology*, *Statistical Science*, *Political Analysis*, and *Annals of Applied Statistics*. I am co-author of *The Hard Count: The Political and Social Challenges of Census Mobilization*.[1] My other experience of relevance includes serving as associate principal investigator of the American National Election Study, on the editorial boards of several academic journals, and as director of the Initiative on Survey Methodology at Duke University. I was also founding director of the Program on Survey Research at Harvard University. From 2012-2018, I served as a member of the Census Scientific Advisory Committee (the "CSAC"), a committee that advises the director of the U.S. Census Bureau (the "Census Bureau") on the uses of scientific developments in statistical data collection, survey methodology, geospatial and statistical analysis, econometrics, cognitive psychology, business operations, and computer science as they pertain to the full range of Census Bureau programs and activities, including census tests, policies, and operations.

[1] Hillygus, D.S., Nie, N.H., Prewitt, K. & Pals, H. (2006). *The hard count: The political and social challenges of census mobilization*, Russell Sage Foundation, New York.

I have previously served as an expert witness *in League of Women Voters of North Carolina, et al. v. North Carolina, et al.*, No. 1:13-CV-00660-TDS-JEP (M.D.N.C.); *State of New York, et al., v. United States Department of Commerce, et al.*, No. 18-CV-2921-JMF (S.D.N.Y.)*;* and *NAACP, et al. v. Bureau of the Census*, No. 18-CV-891-PWG (D. Md.). A copy of my curriculum vitae is attached.

II. Retainer Information and Summary of Opinions

Defendant-Intervenors in this action, and Martinez Intervenors in the cross claim brought against the federal government, retained me to evaluate (1) the claims made by Dr. Dudley Poston in his expert report for the State of Alabama ("Alabama" or "Plaintiff") that inclusion of undocumented immigrants[2] in the total population for apportionment after the 2020 decennial count will cause a loss of one congressional seat in the U.S. House of Representatives (the "House") for Alabama, whereas exclusion of undocumented immigrants from the apportionment count will result in Alabama retaining seven seats; and (2) whether exclusion of undocumented immigrants from the 2020 apportionment count is possible. My compensation in this case is $350 per hour.[3]

Based on the knowledge I have amassed over my education, training, and experience, as well as a detailed review of government and academic research, data, and reports, I have reached the following opinions:

[2] For the purposes of this report, I use the term "undocumented immigrant" to include foreign-born non-citizens that reside in the U.S. but do not have formal legal status. Pew Research Center refers to these individuals as "unauthorized immigrants." I recognize that those with Deferred Action for Childhood Arrivals, or some other form of lawful presence, may or may not be categorized as undocumented immigrants, depending on the context. I offer no opinion as to the legal significance of these various classifications.

[3] To formulate an expert opinion in this case, I reviewed a variety of materials from academic, governmental, legal, and media sources, *see* References, including the Complaint for Declaratory Relief and the exhibits in the Depositions of Karen Battle on January 16, 2020 and March 2, 2020 in *Alabama et al. v. United States Department of Commerce et al.*, No. 2:18-cv-00772-RDP (N.D. Al. 2018). Moreover, I relied on my own experiences and familiarity with survey practices and standards and Census Bureau programs and activities.

First, Dr. Poston does not demonstrate, to any degree of reasonable certainty, that Alabama will (a) lose a congressional seat because of the inclusion of undocumented immigrants in the 2020 apportionment count, or (b) maintain a congressional seat because of the exclusion of undocumented immigrants in the 2020 apportionment count.

Second, there is no reliable way to exclude undocumented immigrants from the 2020 apportionment count because (a) there is currently no reliable methodology or data product that the Census Bureau may use to do so; (b) no administrative records are of sufficient quality to use to exclude undocumented immigrants from the 2020 apportionment count; and (c) the nature, scope, and methodology of the statistical modeling needed to produce estimates of the undocumented population is fundamentally different from the statistical modeling currently used in producing the apportionment population, and would result in a less accurate and reliable enumeration.

In this report, I first provide background with respect to the Census Bureau's relevant responsibilities and standards, as related to the apportionment count. I then explain why Dr. Poston's methodology, data, and key conclusions are unreliable, and cannot be used to demonstrate that Alabama will likely lose a congressional seat because of the inclusion of undocumented immigrants in the 2020 apportionment count, or maintain a congressional seat if undocumented immigrants are excluded from the 2020 apportionment count. Finally, I explain why I conclude that there is currently no feasible way to reliably exclude undocumented immigrants from the apportionment count.[4]

III. Relevant Background

A. The Census Bureau's Relevant Responsibilities

[4] I am not an attorney and my references to constitutional and statutory provisions and court cases are for the purposes of providing factual context.

Article 1, Section 2 of the U.S. Constitution requires that an "actual enumeration" of the population be taken every 10 years for the purpose of apportioning seats in the House among the states, with the provision that each state must have at least one Representative. The 14th Amendment states that "[r]epresentatives shall be apportioned among the several States according to their respective numbers, counting the whole number of persons in each State."

The Census Bureau has the responsibility of both counting the population in the decennial census, and using the results to calculate the number of House seats each state is entitled to have based on that population count. The Census Bureau counts all people (citizens and foreign-born immigrants) who are living in the state at the time of the census.[5] This total resident population, along with the overseas federal employees and their dependents, make up the apportionment population count for each state. To count all people, the Census Bureau uses a multi-part process that starts with (1) creating the Master Address File (the "MAF")—a database containing every known housing unit in the country, then (2) asking every household in the MAF to self-respond with information about their household, followed by (3) employing the Non-Response Follow-up (the "NRFU") operation, which attempts to enumerate all non-responding households through an in-person visit,[6] and, finally, (4) applying count imputation to any remaining uncounted households to estimate the number of household members using information from neighboring households. By law, the Census Bureau must submit the apportionment count to the President within nine months of the census date. For the 2020 Census, the census date is April 1, 2020, and the President will receive the counts by December 31, 2020.

[5] Immigrants, called "foreign-born" by the Census Bureau, include naturalized U.S. citizens, lawful permanent residents, temporary migrants (such as foreign students), refugees and asylees, and undocumented immigrants.
[6] If a household is not enumerated after one visit, administrative records will be used to enumerate the household in those cases in which multiple, high-quality records are available. If administrative records cannot be used, at least two more in-person visits are attempted before the household becomes eligible to be enumerated through a proxy, such as a neighbor or landlord.

Since 1940, the Census Bureau has used the Equal Proportions Method to allocate the number of Representatives among the states—after each state is assigned the one seat it is entitled to receive, the remaining 385 seats are assigned sequentially, on the basis of a list of descending "priority values" that are calculated based on each state's share of the total U.S. population.[7] Because apportionment is based on population size relative to other states, under- or over- counting the population in one state has implications for the fair distribution of representation among all states.[8]

Within one year of the census date—April 1, 2021 for the 2020 Census—the Census Bureau is also required to make redistricting data available to the states. Whereas the apportionment count is produced using the Census Unedited File (the "CUF"), the redistricting data products are produced using the Census Edited File (the "CEF"), which applies characteristic imputation—statistically imputing missing or conflicting information about the people in the household (i.e., race, ethnicity, age, date of birth, sex, tenure, and relationship).[9] The redistricting data are also altered to meet the confidentiality requirements of Title 13 of the United States Code.[10]

[7] This method ensures that no additional transfer of a seat (from one state to another) will reduce the ratio between the numbers of persons per representative in any two states. For more detail, *see* https://www.census.gov/population/apportionment/about/faq.html and https://www.census.gov/population/apportionment/about/computing.html.

[8] Prewitt, K. (2010). The US decennial census: Politics and political science. Annual Review of Political Science, 13, 237-254.

[9] The total resident population count in the CUF and CEF has applied count imputation—an estimate of the number of household members—for the limited number of households not enumerated in the decennial count. In 2010, count imputation accounted for only 0.39% of the total population. 2020 Census Operational Plan: A New Design for the 21st Census, v. 4. (December 2018), available at https://www2.census.gov/programs-surveys/decennial/2020/program-management/planning-docs/2020-oper-plan4.pdf.

[10] The data are processed through the disclosure avoidance system that injects noise into the estimates, creating uncertainty in the numbers to protect confidentiality. *See* https://www.census.gov/newsroom/blogs/research-matters/2018/08/protecting_the_confi0.html.

Neither the CUF nor the CEF has information about the citizenship or legal status[11] of the population.

Following President Trump's July 2019 Executive Order 13880,[12] the Census Bureau plans to use administrative records to separately produce data on block-level Citizen Voting-Age Population ("CVAP data" or "CVAP") by race and ethnicity.[13] As of the date of this report, the methodology to produce this data product is still under development.[14]

B. The Census Bureau's Quality Standards

The Census Bureau has formal standards for data quality governing all information products and the processes that generate them.[15] These guidelines require that all information collected and disseminated by the Census Bureau be designed to ensure and maximize the utility, objectivity, and integrity of the information. *Utility* or "fitness of use" refers to the "usefulness of the information for its intended users;" *objectivity* means the information is "accurate, reliable, and unbiased, and is presented in an accurate, clear, complete, and unbiased manner;" and *integrity* refers to the security of the information, including protection of such information from unauthorized access or revision.[16]

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[11] For the purposes of this report, I use the term "legal status" to encompass determinations of whether individuals are immigrants with formal legal status, or immigrants without formal legal status. I offer no opinion as to the legal significance of these various classifications.
[12] *See* 84 Fed. Reg. 33,821 (July 11, 2019).
[13] *See* https://www2.census.gov/programs-surveys/decennial/rdo/technical-documentation/special-tabulation/CVAP_Post2020_Census_documentation_v5.pdf?. The Census Bureau previously provided CVAP tables annually from each year's most recent 5-year American Community Survey ("ACS") data. The Post-2020 Census CVAP Special Tabulation will replace CVAP tables based on the ACS that would have been released in February 2021. A census block is the smallest geographic unit used by the Census Bureau. Census blocks are defined by geographic features, such as roads, so they vary in the exact number of households they contain—many contain no population. More than 11 million census blocks were enumerated in 2010. *See* https://transition.fcc.gov/form477/Geo/more_about_census_blocks.pdf.
[14] *See* https://www.census.gov/programs-surveys/decennial-census/about/voting-rights/cvap/Post-2020-CVAP.html.
[15] *See* U.S. Census Bureau Statistical Quality Standards (July 2013), https://www.census.gov/content/dam/Census/about/about-the-bureau/policies_and_notices/quality/statistical-quality-standards/Quality_Standards.pdf. These standards were established to incorporate and adhere to Policy Directive No. 1 of the Office of Management and Budget ("OMB"). *See* https://www.govinfo.gov/content/pkg/FR-2014-12-02/pdf/2014-28326.pdf.
[16] *See* U.S. Census Bureau Statistical Quality Standards (July 2013), i-ii.

These formal standards govern the Census Bureau's mission to "count everyone once, only once, and in the right place" in the decennial census.[17] Critically, objectivity refers not only to the overall accuracy of the information, but also to distributional accuracy—a complete and accurate count across geography and population subgroups so that the proportional distribution of the population is correct.[18] If the Census Bureau misses more people living in one state than another, the census count is not only inaccurate, it is will also be unfair for apportionment in violation of both the utility and objectivity quality standards.

IV. Dr. Poston's Data, Methodology and Key Conclusions Are Not Credible.

Dr. Poston opines that in 2020, Alabama will receive six seats if undocumented persons are included in the apportionment count, compared to seven seats if undocumented persons are excluded from the apportionment count.[19] To reach these opinions, Dr. Poston's analysis hypothetically apportions congressional seats for all states using a projected 2020 total population count, and then compares the results to a hypothetical apportionment of congressional seats using a 2020 projected population count that excludes undocumented persons.[20] Dr. Poston's conclusions depend on: (1) projections of total population numbers of each state (including the overseas population) in 2020 based on 2010 Census Bureau apportionment counts, and 2018 and 2019 Census Bureau population estimates; and (2) projections of the population of undocumented immigrants in each state in 2020 based on estimates in 2016 of the undocumented immigrant population from Pew Research Center ("Pew"), an independent American think tank founded in 2004 by pollster Andrew Kohut.

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[17] *See* https://www.census.gov/programs-surveys/decennial-census/about/why.html.
[18] Prewitt, K. (2010). The US decennial census: Politics and political science. *Annual Review of Political Science*, 13, 237-254.
[19] Sworn Declaration & Expert Report of Dudley L. Poston, Jr., Ph.D. (January 23, 2020) (the "Poston Report"), 3.
[20] Poston Report.

Dr. Poston's overall conclusions, methodology, and underlying data are unreliable. Dr. Poston fails to acknowledge massive uncertainty in his estimates, and he relies on flawed assumptions that are likely to bias his results. Statisticians and demographers readily acknowledge that projections of future populations figures can be unreliable.[21] Projection outside of known data requires assumptions that should be validated. Dr. Poston, however, fails to assess the reasonableness of the modeling and data assumptions that he makes.[22]

Moreover, Dr. Poston ignores the uncertainty in his estimates, in violation of basic statistical principles. All modeled estimates, like the projections Dr. Poston advances in his report, have uncertainty, which is a quantification of accuracy and precision, placing confidence limits, or bounds, on modeled estimates. Such uncertainty is especially critical to acknowledge in the context of apportionment because apportionment outcomes are sensitive to small changes in population counts. Statisticians have called this issue "the apportionment problem"— that very small inaccuracies in a state population can change the number of representatives received—and have shown this to be an "inescapable property of any method of apportionment that is a function of population."[23] This means that predictions about apportionment outcomes are often wrong given the difficulty of precisely projecting population. For example, prior to the 1990 Census, the Census Bureau correctly predicted only three of the five eventual seat

[21] Skerry, P. (2000). Counting on the census? Race, group identity, and the evasion of politics (Vol. 56). Brookings Institution Press, 131.
[22] For review of various approaches, *see* Hyndman, R. J., & Athanasopoulos, G. (2018). Forecasting: principles and practice. OTexts. A key assumption is the time frame that informs the forward projection, e.g., 2010-2018 versus 2017 to 2018. The other key assumption is the modeling of the trend, whether linear or exponential, for example.
[23] Keyfitz, N. (1979). Information and allocation: two uses of the 1980 census. *The American Statistician*, 33, 45-50. It is highly unlikely, but theoretically possible, that the omission of a single person from a state population could result in the loss of a representative. On the other hand, an omission of 100,000 persons would have a one in five chance of depriving that state of a representative.

changes.[24] The Census Bureau 2009 population estimates similarly did not predict all of the 12 seats gained and 12 seats lost.[25]

Below, I discuss in more detail the significant flaws in each of Dr. Poston's projections, and then explain how these errors contribute to massive uncertainty in his estimates, and result in unreliable and unconvincing conclusions.

A. Dr. Poston's Data and Methodology for Projecting Total Population Counts Are Flawed.

In projecting total population numbers for each state in 2020, Dr. Poston starts with Census Bureau population estimates for each state from July 2018, and, in his supplemental report, from July 2019.[26] In contrast to the actual enumeration that the Census Bureau conducts in each decennial census, these yearly population estimates from the Census Bureau are statistically modeled—i.e., they are adjustments to the decennial count made to attempt to account for births, deaths, and migration.[27] These population estimates can differ significantly from census counts, most notably because of the difficulty of estimating net international migration.[28]

Dr. Poston then assumes, without evidence, that each state's population will grow or decline in population at the same average annual rate between 2018 (or 2019 in the supplemental report) and 2020 as it did between 2010 to 2018 (or 2019 in the supplemental report).[29]

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[24] According to Skerry (2000), 131.
[25] *See* https://www.psc.isr.umich.edu/dis/census/Features/apportionment/apportion_estimates.html.
[26] *See* Poston Report, 14; Supplement to Sworn Declaration & Expert Report of Dudley L. Poston, Jr., Ph.D. (Jan. 28, 2020) ("Poston Supplementary Report"), 3.
[27] *See* https://www2.census.gov/programs-surveys/popest/technical-documentation/methodology/2010-2018/2018-natstcopr-meth.pdf?#.
[28] In 1980 and 2000, for example, the population estimated underestimated relative to the census count by more than 2 percentage points. Tiffany Yowell and Jason Devine. (July 2013, Revised May 2014). Evaluating Current and Alternative Methods to Produce 2010 County Population Estimates, U.S. Census Bureau, https://www.census.gov/population/www/documentation/twps0100/E2%20County%20Totals_FINAL.pdf.
[29] Poston report, 14; Poston Supplementary Report, 3.

However, documentation of significant geographic and temporal variability in population change by the Census Bureau indicate that this is a flawed assumption. With respect to geography, there has been wide variability in population growth patterns across states within the decade; for example, the Census Bureau reports that, from 2010 to 2019, states have seen changes in total population growth and loss ranging from a 3.3% loss in population (West Virginia) to a 16% growth in population (Utah).[30] With respect to time, the nation's overall population growth rate, for instance, has slowed over the course of the decade.[31] And there is temporal variation in the population growth across states. For example, the state of New York saw population growth from 2010 until 2015, but population loss in the years since; in contrast, the state of Texas has seen population growth.[32] These inconsistent population growth patterns indicate that Dr. Poston's population projections are inaccurate and demonstrate the unreliability in Dr. Poston's estimates, undermining confidence in his conclusions.

Dr. Poston also assumes, without evidence, that a state's overseas population will be the same proportion of the population in 2020 as it was in 2010.[33] This too is inaccurate. In 2016, the number of active-duty U.S. military troops stationed overseas declined to its lowest level in at least 60 years.[34] A change in the residency rules affecting overseas-deployed military personnel also makes it untenable to assume the overseas population will be the same in 2010 as it was in 2020. Specifically, in 2010, deployed military personnel were counted in their "home of record" state (the address provided at the time of enrollment in the military). In 2020, by contrast, military personnel will be counted at their usual residence. This will likely increase the

[30] *See* https://www.census.gov/quickfacts/geo/chart/US/PST120219.
[31] *See* https://www.census.gov/library/visualizations/2019/comm/slower-growth-nations-pop.html.
[32] *See* https://www.census.gov/data/tables/time-series/demo/popest/2010s-state-total.html.
[33] Poston Report, 14.
[34] Bialik, Kristen. (August 22, 2017). U.S. Active-Duty Military Presence Overseas Is At Its Smallest In Decades. Pew Research Center. https://www.pewresearch.org/fact-tank/2017/08/22/u-s-active-duty-military-presence-overseas-is-at-its-smallest-in-decades/.

overseas populations of states with major military installations, which further emphasizes the uncertainty, of Dr. Poston's calculations.[35] And finally, as noted above, there has also been wide variability in population growth patterns across states, which means that the overseas population is likely to increase in some states but decrease in others in 2020. Dr. Poston concedes that he has not taken into account any of these issues with respect to the overseas population.[36]

In sum, the assumptions underlying Dr. Poston's total population projections are problematic, undermining the credibility of his calculations and highlighting the difficulty of accurately predicting apportionment outcomes.

B. Dr. Poston's Data and Methodology for Projecting Apportionment Counts Excluding Undocumented Immigrants is Flawed.

Dr. Poston next projects a population count for each state excluding undocumented immigrants by (1) relying on the flawed projection of the total population count, as described above, and (2) subtracting from that count a projected count of the undocumented immigrants in each state.[37] To reach a count of the undocumented immigrants in each state, Dr. Poston relies on 2016 state-level estimates of undocumented immigrants from Pew, and assumes that the proportion of the undocumented immigrant population in a state will be unchanged from the population proportion Pew estimated for a state in 2016.[38] This approach is flawed for a number of reasons, as follows.

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[35] Jarosz, Beth. (October 28, 2019). How Does the U.S. Census Bureau Count People Who Have More Than One Address? PRB. https://www.prb.org/how-does-the-u-s-census-bureau-count-people-who-have-more-than-one-address/.

[36] Deposition of Dudley L. Poston, Jr., Ph.D. (Feb. 27, 2020), at 105-114.

[37] Poston report, 16.

[38] Pew defines unauthorized immigrants as "all foreign-born noncitizens residing in the country who are not `lawful immigrants…The vast majority of unauthorized immigrants entered the country without valid documents or arrived with valid visas but stayed past their visa expiration date or otherwise violated the terms of their admission." Passel et al. (2018), 2. This is the same definition I use throughout this report.

First, Dr. Poston's assumption that the proportion of the undocumented immigrant population in a state will not change between 2016 and 2020 is simply wrong. Most glaringly, the assumption contradicts Pew's own updated estimates for 2017.[39] Indeed, Pew reports significant variation across states and time in the undocumented population, including a continued decline in the overall numbers of undocumented immigrants in the United States.[40] As one example, Pew reports that California's undocumented immigrant population was 2.2 million in 2016, compared to 2.0 million in 2017—at the same time, the Census Bureau reports an overall growth in total population for the California between 2016 to 2017.[41] Moreover, there are substantial reasons to believe that the changes in immigration policy from 2010 to 2020 have had significant impacts on the undocumented immigrant populations in many states, none of which are taken into account by Dr. Poston's numbers.[42] Given the already mentioned variation in the total population change across states—the denominator for calculating the proportion of the undocumented immigrants in a state—some states will see their proportion of undocumented immigrants increase in 2020 relative to 2016, while others will likely see it decrease.

Second, and more fundamentally, Dr. Poston ignores the massive and undisputed uncertainty in Pew's estimates of undocumented immigrants. Uncertainty is a critical part of *every* statistical estimate, but it is especially remiss to ignore it when estimating the size of the undocumented immigrant population in the United States given that government agencies, scholars, and policy-makers widely acknowledge that this population is difficult to estimate.[43]

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[39] 2017 estimates were released in June 2019 so it's unclear why Dr. Poston did not use the more recent estimates.
[40] *See* https://www.pewresearch.org/hispanic/interactives/unauthorized-trends/.
[41] *See* https://www.census.gov/content/dam/Census/library/visualizations/2017/comm/popest-idaho.pdf.
[42] Warren, Robert. (February 27, 2019). Sharp Multiyear Decline in Undocumented Immigration Suggests Progress at US-Mexico Border, Not a National Emergency. https://cmsny.org/publications/essay-warren-022719/.
[43] For review, *see* Woodrow-Lafield, K. A. (1998). Undocumented immigrants in the United States in 1990: Issues of uncertainty in quantification. International Migration Review, 32(1), 145-173. Demographers acknowledge that many methods fail to account for uncertainty, instead treated "values as if they were true" (Van Hook et al. 2015, 331). However, previous estimates have not be considered for use to determine political representation.

For example, while Pew estimated an undocumented population of 10.7 million in 2016, researchers at Yale estimated that the 2016 number of undocumented immigrants ranged from a conservative 16.7 million to a high of 27.5 million.[44] While Dr. Poston admits (in a footnote) that "there are inherent difficulties in counting undocumented immigrants," he fails to account for that uncertainty in his conclusions.[45] These massive uncertainties include (1) uncertainties with respect to Pew's overall methodological approach, and (2) uncertainties with respect to the specific data and methodology on which components of Pew's estimates rely, as described below.

1. Pew's Overall Methodology for Projecting Apportionment Counts Excluding Undocumented Immigrants Produces an Unreliable Estimate.

Estimates of the undocumented population vary widely depending on the methodological approach, assumptions, and underlying data used. Broadly, Pew relies on a method called the residual technique for estimating numbers of undocumented immigrants in the United States. The residual technique estimates the number of undocumented immigrants by subtracting the number of lawful immigrants—estimated from government records—from the total number of immigrants in the country, as estimated from self-report responses to government surveys. The residual technique is one that has also been used by the Department of Homeland Security ("DHS"),[46] the Migration Policy Institute, the Center for Migration Studies of New York, and, in previous years, by the Census Bureau.[47]

[44] Fazel-Zarandi, M. M., Feinstein, J. S., & Kaplan, E. H. (2018). The number of undocumented immigrants in the United States: Estimates based on demographic modeling with data from 1990 to 2016. PloS one, 13(9).
[45] Poston Report, 16 n.2.
[46] Prior to 2018, DHS population estimates referred to foreign-born non-citizens unlawfully present in the United States as "unauthorized immigrants." The 2018 report changes the term to "illegal aliens."
[47] *E.g.*, Baker, B. (2018). Population Estimates: Illegal Alien Population Residing in the United States: January 2015. Washington, DC: Department of Homeland Security. https://www.dhs.gov/sites/default/files/publications/18_1214_PLCY_pops-est-report.pdf.

Although the aggregate numbers of undocumented immigrants resulting from the residual technique can be somewhat similar—recent estimates ranging from 10.5 million to 12 million[48]—there is considerable variability within subgroups and at smaller geographies.[49] In recognition of the limitations of the residual technique, when the Census Bureau released 2001 residual estimates of the undocumented population, they provided the following disclaimer:

> "Although the residual technique . . . is based on the simple idea of subtracting the expected legal population from the counted foreign-born population at the census date, *the approach suffers from a number of limitations.* These limitations stem from anomalies and shortcomings in the data sets used, assumptions made to correct for data deficiencies or to derive intermediate estimates, and the exclusion of components that may prove to be relevant in the changing migration environment."[50]

Similarly, DHS also acknowledges that their estimates of undocumented populations are "subject to sampling error in the ACS and considerable non-sampling error because of uncertainty in some of the assumptions required for estimation . . . Caution is recommended."[51] A March 2019 DHS report explains:

> DHS's ability to describe the illegal alien population depends on its ability to describe the different population groups included in the residual methodology: the total foreign-born population and the subgroups that comprise the legally resident foreign-born population. *Data limitations mean that neither of these populations can be described with precision.*[52]

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[48] Kamarck, Elaine and Christine Stenglein. (November 12, 2019). How many undocumented are in the United States and who are they? Brookings Institute. https://www.brookings.edu/policy2020/votervital/how-many-undocumented-immigrants-are-in-the-united-states-and-who-are-they/.

[49] Van Hook, J., Bachmeier, J. D., Coffman, D. L., & Harel, O. (2015). Can we spin straw into gold? An evaluation of immigrant legal status imputation approaches. Demography, 52(1); Baker, B. (2018). Population Estimates: Illegal Alien Population Residing in the United States: Jan. 2015. Washington, DC: Dep. of Homeland Security.

[50] Costanzo et al. Evaluating Components of International Migration: The Residual Foreign Born. June 2002, page 20. https://www.census.gov/content/dam/Census/library/working-papers/2001/demo/POP-twps0061.pdf (emphasis added). The Census Bureau emphasized that "Our assumptions include a great deal of uncertainty, especially for small migration components. Therefore, the residual may be quite different from the actual number of unauthorized migrants" (2).

[51] Office of Immigration Statistics, Homeland Security. (December 2018). Population Estimates: Illegal Aliens Population Residing in the United States: January 2015, 11. Although DHS produces an estimate of the undocumented immigrant population using a residual method similar to Pew, they do not produce population estimates for every state.

[52] Department of Homeland Security, "Potential Improvements to DHS Illegal Alien Population Estimates: Collection and Use of Data," Fiscal Year 2018 Report to Congress, March 5, 2019, page 1.

In employing the residual method, Pew estimates the number of undocumented immigrants by subtracting the number of immigrants with formal legal status—estimated from government records from DHS—from the total number of immigrants in the country, as estimated from self-report responses to the American Community Survey (the "ACS").[53] Because it is known that immigrants (especially undocumented immigrants) are harder to locate, harder to contact, harder to persuade, and harder to interview,[54] Pew then "augments and adjusts" their estimates in an attempt to account for the fact that surveys are more likely to miss immigrants.[55] To get state-level estimates, the legal status of each foreign-born respondent is imputed based on their survey responses and the total population estimates, aggregated, and then weighted to develop state-level estimates that take into account trends over time.[56] Additionally, Pew often makes revisions to previous estimates and the exact way in which it employs the residual method. For example, Dr. Poston used Pew's 2016 estimate of 55,000 for the undocumented population in Alabama in 2016; yet, their 2017 estimates report the 2016 undocumented population in Alabama to be 60,000.[57]

The accuracy of the residual technique estimates critically depends on the accuracy of the individual data components, and the assumptions used.[58] While Pew is not transparent about all of their data components and assumptions, those that can be scrutinized show that Pew's approach is error-prone and massively uncertain. It is not surprising, then, that demographers

[53] Passel et al. (2018), 37.
[54] Tourangeau, R., Edwards, B., Johnson, T. P., Wolter, K. M., & Bates, N. (Eds.). (2014). Hard-to-survey populations. Cambridge University Press.
[55] *See* https://www.pewresearch.org/hispanic/2018/11/27/u-s-unauthorized-immigrant-total-dips-to-lowest-level-in-a-decade/.
[56] Passel et al. (2018), 44.
[57] *See* https://www.pewresearch.org/hispanic/interactives/unauthorized-trends/.
[58] Margo Anderson and Stephen Feinberg (Who Counts?), 59: "The accuracy of the demographic analysis depends on the accuracy of the inputs. Several of the statistical inputs are incomplete.

call their estimates "difficult to replicate."[59] An evaluation of the approach also found significant biases in the resulting estimates.[60] One recent peer-reviewed academic research article explained that although Pew's estimates "have come to be trusted and widely cited outside of academia," the method has never been evaluated and "[t]he specific details of the Pew[ ] method are not publicly available, thus making it difficult for other researchers to replicate the method."[61] The authors conclude that "it is not possible to spin straw into gold."[62] The specific flaws in each of the components of Pew's estimates that contribute to the unreliability of Dr. Poston's conclusions are discussed in detail below.

2. The Data Components and Specific Method of Pew's Residual Approach Are Not Reliable.

i. Pew and Dr. Poston rely on unreliable and inaccurate ACS estimates of the total foreign-born population.

In estimating the number of undocumented immigrants using the residual technique, Pew starts by estimating the total number of foreign-born residents—anyone who was not a U.S. citizen from birth—from the ACS. The ACS is a nationwide survey designed and conducted by the Census Bureau that collects social, economic, housing, and demographic characteristics from approximately 1.6% of households annually.[63] The ACS asks about the citizenship status—but not the legal status—of each household member. The sampling errors and nonsampling errors in ACS, and Pew's undercount adjustments with respect to this population, undermine confidence in Pew's estimates of the total foreign-born population, on which Dr. Poston relies.

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[59] Van Hook, J., Bachmeier, J. D., Coffman, D. L., & Harel, O. (2015). Can we spin straw into gold? An evaluation of immigrant legal status imputation approaches. Demography, 52(1), 333.
[60] *Ibid.*
[61] *Ibid*, 330.
[62] *Ibid*, 330.
[63] The ACS replaced the Census long form after 2000. The ACS is implemented as a continuous survey, with about 3.5 million household addresses contacted each year. The Census Bureau releases yearly estimates that allow for characteristic estimates for populations of 65,000 or more. The ACS accumulates sample into 5-year estimates for smaller geographic areas, including census tracts and block groups.

1. Sampling errors in underlying ACS estimates make Pew's numbers unreliable.

Because the ACS is a sample of the population, rather than a census, any resulting population estimates are subject to uncertainty from random sampling error.[64] That sampling error is often reported as a margin-of-error with survey statistics. The greater the margin of error, the less confidence one should have in the resulting statistical estimate.[65] For small population subgroups or geographies—such as state-level estimates of the foreign-born population—the sampling error in the ACS can be quite large.

Although Pew reports its estimates of undocumented immigrants with a sampling error,[66] Dr. Poston fails to acknowledge or account for such sampling error in his calculations. For example, Pew's estimate of the number of undocumented immigrants in Alabama in 2016 was 55,000 +/- 10,000.[67] That is, Pew's estimate has a 90% confidence interval of 45,000 to 65,000 undocumented immigrants in Alabama in 2016—revealing a large degree of uncertainty in the estimate, even before trying to make projections in the future.[68] To put that level of uncertainty into context, consider that in the 2000 Decennial Census, Utah would have needed fewer than 1,000 additional residents to qualify for the 435th and final congressional seat instead of North Carolina.[69] In other words, the margin of error on the number of undocumented immigrants was larger than the population difference between two states determining priority values for

[64] Groves, R. M., Fowler Jr, F. J., Couper, M. P., Lepkowski, J. M., Singer, E., & Tourangeau, R. (2011). Survey methodology (Vol. 561). John Wiley & Sons.
[65] Error has a statistical meaning—referencing the unknown difference between an estimate and its true value. Sampling error that there will be random sample-to-sample variation if one was to draw multiple samples from the population.
[66] Passel et al. (2018), 45.
[67] Passel et al. (2018) and https://www.pewresearch.org/hispanic/interactives/unauthorized-trends/.
[68] This means that 90% of the time, the true population estimate of undocumented immigrants in Alabama would fall between 45,000 to 65,000.
[69] *See* https://www.pewsocialtrends.org/2011/01/11/census-2010-the-last-seat-in-congress/.

apportionment.[70] Pew further reports that this margin of error *underestimates* the extent of uncertainty in the estimate because it captures only sampling, but not nonsampling, errors:

> "The ranges reported represent a 90% confidence interval around the estimates. They represent the sampling error associated with the survey-based estimate. Other sources of potential error—including the variability associated with the random assignment of statuses, potential errors in the status assignment process and non-sampling error in the surveys—are not represented in the reported margins of error. For this report, statistical tests rely on a 90% confidence level."[71]

2. Nonsampling errors in underlying ACS estimates make Pew's numbers unreliable and inaccurate.

There are a variety of other sources of error in Pew's estimates in addition to sampling errors that threaten the accuracy and reliability of Pew's estimates. Broadly called nonsampling errors, these include all other sources of error, such as those that arise from misreporting, incomplete coverage, or data processing. Although nonsampling errors can be more difficult to quantify than sampling errors, they still demonstrate the lack of precision in Pew's, and in turn, Dr. Poston's estimates of undocumented immigrants.

First, it is widely recognized that citizenship status is often inaccurately reported in government surveys.[72] One study using the Census Bureau's Current Population Survey estimated that 75 percent of those who reported being naturalized citizens and living in the U.S. fewer than five years were in fact non-citizens at the time of the survey.[73] In a recent comparison of administrative records from the Social Security Administration with individual

[70] *See* https://www.pewresearch.org/hispanic/interactives/unauthorized-trends/. Similarly, Pew estimates the number of undocumented immigrants in North Carolina in 2010 to be 350,000 +/- 15,000; the number in Minnesota was 90,000 +/- 10,000, so that the uncertainty again exceeds the population difference.
[71] Passel, J. S., & Cohn, D. (2018). US Unauthorized immigrant total dips to lowest level in a decade. Pew Research Center.
[72] Bachmeier, J. D., Van Hook, J., & Bean, F. D. (2014). Can we measure immigrants' legal status? Lessons from two US surveys. International Migration Review, 48(2), 538-566.
[73] Passel JS, Clark RL. How Many Naturalized Citizens Are Thee? An Assessment of Data Quality in the Decennial Census and CPS. Paper presented at the Annual Meeting of the Population Association of America; Washington, DC. March 1997, as reported in Brown et al. (2018).

responses to the ACS, census researchers found that 37.6 percent of those individuals who were recorded as non-citizens in administrative records had self-reported being U.S. citizens in the ACS.[74] As explained by the researchers, undocumented immigrants "have a strong incentive to provide an incorrect survey answer, if they answer at all, due to concerns about the data being used for enforcement."[75]

Second, and, even more problematic for Dr. Poston's apportionment estimates, misreporting is likely to vary by geography, raising concerns about the way that measurement error might disproportionately affect estimates of undocumented immigrants in some states more than others, and thus threaten the distributional accuracy of the resulting estimates. Census researchers acknowledge that "the extent of intentional misreporting is most likely to vary across geographical areas and over time, depending on the degree of concern about personal security."[76] Indeed, Census Bureau research finds that match rates between the ACS and administrative records is lower in Alabama than any other state—65% compared to a high of 89% in Maine.[77] This both highlights the inherent difficulty of estimating the undocumented immigrant population, and suggests that Pew, and in turn, Dr. Poston, underestimates the number of undocumented immigrants in Alabama compared to other states, which would lead to an overestimate of Alabama's apportionment population if undocumented immigrants are excluded.

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[74] Moreover, this is likely an underestimate because the noncitizens able to be matched to administrative records are more likely to be legal noncitizens. Brown et al. (2018).

[75] J. Brown et. al., Working Paper: Understanding the Quality of Alternative Citizenship Data Sources for the 2020 Census, Center for Economic Studies, U.S. Census Bureau, 18–38 (2018), https://www2.census.gov/ces/wp/2018/CES-WP-18-38.pdf.

[76] Brown et al., 21.

[77] Bhaskar, R., Fernandez, L. E., & S. Rastogi. (2018). Assimilation and coverage of the foreign-born population in administrative records. Center for Administrative Records Research and Applications (CARRA) Working Paper Series #2015-02., April 21, 2015. Mulrow et al. (2011) similarly find considerable geographic variation in the ability match administrative records to ACS respondents. Mulrow, Edward, Ali Mushtaq, Santanu Pramanik, and Angela Fontes. 2011. "Final Report: Assessment of the U.S. Census Bureau's Person Identification Validation System," NORC at the University of Chicago, http://www.norc.org/PDFs/May%202011%20Personal%20Validation%20and%20Entity%20Resolution%20Conference/PVS%20Assessment%20Report%20FINAL%20JULY%202011.pdf.

In other words, in Dr. Poston's analysis, Alabama would inaccurately benefit from higher levels of misreporting in the state.

In sum, there is clear evidence that Pew's estimates are subject to large amounts of measurement error in the ACS estimates of foreign-born residents, jeopardizing the reliability of the resulting estimates. Misreporting of citizenship status is pervasive and appears to vary across states, resulting in biased estimates of an apportionment population with undocumented immigrants excluded.

3. Undercount adjustments in the total foreign-born population make Pew's numbers unreliable.

Another source of imprecision in the Pew estimates involves the statistical adjustment made to try to account for immigrants being disproportionately missed by the ACS. Surveys always miss some people, but immigrants (and especially undocumented immigrants) are especially likely to be undercounted—a source of error called coverage error. Unfortunately, the extent of the undercount is unknown and unknowable, so Pew has to make a guess as to how and how much to adjust their statistical estimates.

Pew reports that their adjustment increases the size of the undocumented immigrant population by 5% to 7% for the years 2010-16.[78] It is not possible to assess the reasonableness of Pew's statistical adjustment because the methodology is not disclosed. Pew simply states that undercount adjustments are based on "comparisons with Mexican data, U.S. mortality data and specialized surveys conducted at the time of the 2000 census."[79] For comparison, DHS assumes

[78] Passel et al. (2018), 44.

[79] *See* https://www.pewresearch.org/hispanic/wp-content/uploads/sites/5/2019/03/Pew-Research-Center_2018-11-27_U-S-Unauthorized-Immigrants-Total-Dips_Updated-2019-06-25.pdf, 44. Research shows, for example, that the undercount of young children varies across states and county size—undercounts are large in more populous counties than less populous ones. O'Hare, W. P. (2019). Differential undercounts in the US Census: Who is missed?. Cham: Springer Open.

that the undercount of undocumented immigrants is 10% based on a study about LA County in California in the 2000 decennial census.[80] It is, of course, also problematic to assume that the undercount hasn't changed since 2000, or that it is the same across the country as it is in Los Angeles,[81] given geographic variation in the size and nature of the immigrant population. In 2014, for example, the estimated share of undocumented immigrants from Mexico was 5% nationwide, but 70 percent in California, variation that is undoubtedly related to the undercount.[82] For their part, DHS acknowledges that "the exact degree of the undercount is unknown."[83]

The adjustments undergirding the Pew data further undermine confidence in Dr. Poston's estimates. Pew statistically adjusts estimates of the undocumented population to try to account for the undercount of this population; in contrast the total population estimates used by Dr. Poston have not been statistically adjusted for the undercount because the Census Bureau does not statistically adjust census numbers. Following the 2000 Census, the Census Bureau spent enormous resources to research whether statistical methods could be used to adjust for the undercount for use in redistricting and other purposes not related to reapportionment (given the Supreme Court's prohibition on its use for reapportionment).[84] In the end, the Census Bureau determined that the research could not conclude, with a high level of certainty, that the adjusted

[80] Enrico Marcelli, "2000 Census Coverage of Foreign-born Mexicans in Los Angeles County: Implications for Demographic Analysis," presented at 2000 Annual Meeting of the Population Association of American, Atlanta GA.
[81] *See* https://www.pewresearch.org/hispanic/wp-content/uploads/sites/5/2019/03/Pew-Research-Center_2018-11-27_U-S-Unauthorized-Immigrants-Total-Dips_Updated-2019-06-25.pdf, 44.
[82] *See* https://www.ppic.org/publication/undocumented-immigrants-in-california/.
[83] Department of Homeland Security, "Potential Improvements to DHS Illegal Alien Population Estimates: Collection and Use of Data," Fiscal Year 2018 Report to Congress, March 5, 2019, 3.
[84] Whitford, D. C. (2002) Chronologic Overview of the Census 2000 Adjustment Decision. Joint Statistical Meetings - Section on Survey Research. Methods. New York City. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.380.7478&rep=rep1&type=pdf.

census results would be more accurate than the unadjusted results.[85] Any requests for the already-produced adjusted data acknowledged:

> [T]he adjusted estimates were determined to be so severely flawed that all potential uses of these data would be inappropriate. Accordingly, the Department of Commerce deems that these estimates should not be used for any purpose that legally require use of data from the decennial census and assumes no responsibility for the accuracy of the data for any purpose whatsoever.[86]

The very fact that the Census Bureau concluded statistical adjustment could reduce the accuracy of the census count undermines Pew's decision to adjust. It also highlights the inherent imprecision in Pew's estimates, and makes the components of Dr. Poston's calculations (total population count and total population count with undocumented immigrants excluded) incomparable, both of which contribute further to the lack of confidence in Dr. Poston's resulting estimates.[87]

ii. Pew and Dr. Poston rely on unreliable estimates of the lawful immigrant population.

From the total foreign-born population estimated from ACS, the residual technique subtracts the estimated population of naturalized citizens and immigrants with formal legal status—lawful naturalized citizens, legal permanent residents, temporary migrants (such as foreign students), and refugees and asylees—based on estimates from administrative records.[88] In the case of immigrants with formal legal status, lawful permanent residents are estimated using data from DHS's Office of Immigration Statistics, and refugees are estimated using data from the Office of Refugee Resettlement.[89]

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[85] *See* U.S. Bureau of the Census (2001) Report: Recommendation Concerning the Methodology to be Used in Producing Tabulations of Population Reported to States and Localities Pursuant to 13 U.S.C. 141(c) (March 1) Washington, DC Department of Commerce https://www.census.gov/dmd/www/pdf/Escap2.pdf.
[86] *See* https://www.icpsr.umich.edu/icpsrweb/ICPSR/themes/census2000/disclaimer.jsp.
[87] *See* https://govinfo.library.unt.edu/cmb/cmbc/articles-archive/031201.asp.
[88] Administrative records refer to micro data records contained in files collected and maintained by administrative agencies, such as the U.S. Postal Service, Internal Revenue Service, or the Social Security Administration.
[89] *See* https://www.pewresearch.org/hispanic/2018/11/27/unauthorized-immigration-estimate-methodology/.

Scrutiny of Pew's documentation of its reliance on DHS data, and its method with respect to that data, reveals that its estimates are far from an actual count and involve considerable imprecision. Administrative data is incomplete and untimely. As the Census Bureau has recognized, DHS has "incomplete records prior to 2001. These data do not cover naturalizations occurring before 1988, and they miss some between 1988 and 2000."[90] Moreover, available records "do not always cover children under 18 at the time a parent became a naturalized U.S. citizen. These children automatically become U.S. citizens under the Child Citizenship Act of 2000."[91]

Because the administrative records are incomplete and unreliable, Pew estimates the number of legal immigrants by "applying demographic methods . . . with projections to current years, when necessary."[92] Pew makes statistical adjustments to the estimates from administrative records to account for deaths and departures from the country. Once again, the accuracy of the estimates depends on the accuracy of the individual components of the underlying data—yet these components are not known quantities, nor can they assumed to be stable across time or geography. In calculating its own estimates of the undocumented population, DHS admits that the agency "does not know how many lawfully admitted aliens have deceased or departed the United States."[93] Mortality rates are a source of considerable controversy and disagreement among demographers.[94] Departures from the country also vary across time and geography. Pew makes projections, but the exact assumptions underlying those projections are not disclosed and it is clear that precise numbers simply do not exist.

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[90] Brown et al., 18.
[91] Brown et al., 18.
[92] Passel et al. (2018), 36.
[93] Department of Homeland Security, "Potential Improvements to DHS Illegal Alien Population Estimates: Collection and Use of Data," Fiscal Year 2018 Report to Congress, March 5, 2019, 3.
[94] Warren, R., & Warren, J. R. (2013). Unauthorized Immigration to the United States: Annual Estimates and Components of Change, by State, 1990 to 2010. International Migration Review, 47(2), 296–329.

In sum, the estimation of the population of immigrants with formal legal status from administrative records on which Pew relies is not an actual enumeration. Instead, such population is imprecisely estimated using a combination of incomplete administrative records and contentious assumptions. Taken together with the other sources of error outlined above, it is clear that the Pew estimates, and in turn Dr. Poston's results, are imprecise and error prone.

iii. Pew and Dr. Poston rely on unreliable estimates of undocumented immigrants at the state-level.

The state-level estimates of the undocumented immigrant populations that Dr. Poston uses require many additional steps after computation of the national residual estimate outlined above; although Pew treats these steps as deterministic, scrutiny of the complex and unverified set of modeling and data assumptions reveal the imprecision and uncertainty in such estimates.

Specifically, state-level estimates of undocumented immigrants are produced after assigning a legal status to all foreign-born respondents in the ACS. A variety of approaches are used in that assignment—logical decision rules, statistical imputation, and weighting adjustments. The initial categorization of someone as "potentially unauthorized" relies on decision rules using self-reported information about arrival year, country of origin, occupation, participation in government programs, and family relationships that could be indicators of legality. Here, again, Dr. Poston's estimates rest on strong assumptions that are unsubstantiated. For example, the survey responses can be inaccurate (e.g., there can be high levels of missingness and misreporting in arrival year). And the decision rules are not 100% accurate. Some immigrant veterans are deported[95]; some households have mixed immigration status; and some who should be eligible to adjust to lawful permanent resident status do not apply for such

[95] Zamudio, Maria. (June 21, 2019). Deported U.S. Veterans Feel Abandoned By The Country They Defended. NPR. https://www.npr.org/local/309/2019/06/21/733371297/deported-u-s-veterans-feel-abandoned-by-the-country-they-defended.

an adjustment, whether due to lack of money, language barriers, or other reasons.[96] Reflecting the imprecision of Pew's assignment process, Pew acknowledges that the resulting "number of potentially unauthorized immigrants typically exceeds the estimated number of unauthorized immigrants from the residual estimates by 20-35% nationally."[97] This mismatch between the assignment process and the national residual estimates demonstrates the inaccuracy of Pew's complex and opaque process, and highlights the extent to which their resulting population estimates are not precise counts.

To adjust the numbers of undocumented immigrants to bring them in line with the national residual estimates, Pew assigns legal status based on an estimated probability of being an undocumented immigrant, which is in turn based on the occupation distribution by age, sex, and state of residents from the 1989 Legalized Population Survey.[98] This survey benchmark is 30 years old, and overrepresents Mexicans and those in the Southwest.[99] To get state estimates, "the final estimated state totals for any given year take into account estimates for surrounding years; however, only a small number of state estimates require significant adjustment based on the trend analysis."[100] Critically for Dr. Poston's state-by-state count of the undocumented population on which his conclusions rely, Pew does not report which states have inaccurate outcomes that must be significantly adjusted.

[96] Frost, Amanda. (June 19, 2016). The Overlooked Pathways to Legal Status. The Atlantic. As reported, one study found individuals in removal proceedings with legal representation were 15 times more likely to apply for relief than those without lawyers and are 5.5 times more likely to be granted legal status.
[97] Passel and Cohn, 2018, 40.
[98] As reported in Van Hook et al. (2015).
[99] Van Hook, J., Bachmeier, J. D., Coffman, D. L., & Harel, O. (2015). Can we spin straw into gold? An evaluation of immigrant legal status imputation approaches. Demography, 52(1), 332.
[100] Passel and Cohn, 2018, 40.

3. Dr. Poston's Conclusions Are Not Credible.

As I have shown, the individual population projections underlying Dr. Poston's calculations are imperfect approximations subject to considerable uncertainty and sampling and nonsampling errors. To recap, Dr. Poston's projection of the total state population rests on flawed assumptions about population growth over time, geographic variation in population growth over time, and the overseas population, and fails to acknowledge inherent uncertainty in projecting population trends into the future. Regarding the estimates of the number of undocumented immigrants in each state, it is clear that the numbers are not counts, but rather rough and imprecise estimates calculated from incomplete and outdated data using an opaque methodology criticized by demographers. Although Dr. Poston's calculations give the illusion of precision, the individual data components underlying his analysis are error-prone and unreliable. Pew's estimates are not "fit for use" for apportionment; nor are they sufficiently reliable or accurate to support Dr. Poston's opinions that Alabama will lose a seat if undocumented immigrants are included in the population counts, or maintain a seat if they are included.

Given these outlined problems and the sensitivity of apportionment outcomes to small changes in population counts, as discussed above, Alabama's claim that they will lose a seat from the inclusion of undocumented immigrants in the apportionment count, or maintain a seat if undocumented immigrants are excluded, is only speculative. The lack of precision in the data means that different states could have reasonable claims to "priority" to the available seats depending on the particular assumptions made about the many and varying components that underlie Dr. Poston's estimates. Indeed, a 2015 analysis by the Congressional Research Service in which seats were hypothetically apportioned using the 2013 estimated citizen population

reported that Alabama received the same number of seats whether estimated numbers of non-citizens were included or excluded in the apportionment population.[101]

To highlight the uncertainty of Dr. Poston's estimates, sampling error alone is enough to undermine Dr. Poston's conclusion that Alabama is likely to lose a congressional seat if undocumented immigrants are included in the apportionment population, or to maintain a seat of undocumented immigrants are excluded. The reported margin of error on the estimate of the undocumented population ranged from 45,000 to 65,000—that confidence interval (spanning 20,000 persons) is in fact wider than the population difference of the approximately 10,000 additional persons that Election Data Services estimates Alabama would need to gain another congressional seat.[102]

In addition to the extensive uncertainty in the estimates, the geographic variation ignored by Dr. Poston means that both the total population projections and the undocumented population projections are likely to be overestimated in some states and underestimated in others (but not necessarily in the same direction for the two quantities).

V. There Is Currently No Feasible Way to Reliably Exclude Undocumented Immigrants From the 2020 Apportionment Count.

I also examined whether there is a feasible way in which undocumented immigrants could be excluded from the 2020 apportionment count. For numerous reasons, I conclude that there is currently no feasible method by which to exclude undocumented immigrants from the 2020 apportionment count. Specifically, I conclude that excluding undocumented immigrants from the apportionment count in 2020 is impossible because (1) there is no current methodology or data product at the time of this writing that the Census Bureau can use to exclude

[101] Congressional Research Service. 7-5700. R41636. https://crsreports.congress.gov/product/pdf/R/R41636.
[102] *See* https://www.electiondataservices.com/wp-content/uploads/2019/12/NR_Appor19wTablesMaps.pdf, Appendix Main, Page 1.

undocumented immigrants from the 2020 apportionment count; (2) it is not currently feasible for the Census Bureau to produce estimates of undocumented immigrants from administrative records that would be of sufficient quality to use to exclude undocumented immigrants from the 2020 apportionment count; and (3) the nature, scope, and methodology of the statistical modeling needed to produce estimates of the undocumented population is fundamentally different from the statistical modeling currently used in producing the apportionment population, and would result in a less accurate and reliable enumeration.

A. Current Methodologies and Data Products Are Not Sufficient for Excluding Undocumented Immigrants from the Apportionment Count.

It is my opinion that there is no current methodology or data product at the time of this writing that the Census Bureau may use to reliably exclude undocumented immigrants from the 2020 apportionment count. First, as discussed above, the apportionment count is an "actual enumeration" of the population. The Pew methodology on which Dr. Poston relies, and the residual techniques currently used by the federal government to estimate undocumented populations are inadequate for the apportionment count because reliance on estimates from ACS controverts the prohibition on the use of statistical sampling in the production of apportionment population totals.[103] In *Department of Commerce v. U.S. House of Representatives* (1999), the Supreme Court ruled that the Census Act precluded the use of sampling to produce the apportionment count "[w]hether used as a 'supplement' or as a 'substitute.'"[104]

Second, there are no known data products from the 2020 Census that would identify the undocumented immigrant population that Alabama proposes to exclude from the apportionment count. The planned CVAP datafile, described above, is obviously not sufficient for excluding

[103] *Department of Commerce v. U.S. House of Representatives* (1999).
[104] *Department of Commerce v. U.S. House of Representatives* (1999), 24.

undocumented immigrants from the apportionment count because it only identifies the total number of citizens of voting age population. Subtracting the CVAP numbers from total population numbers does not provide the numbers to apportion excluding undocumented immigrants because CVAP does not distinguish undocumented immigrants from legal non-citizen residents, and it does not provide the citizenship or legal status of those younger than 18 years of age. Even if CVAP had sufficient data—which it does not—it is unlikely to be considered of sufficient quality for use in apportionment. In addition, the other data products, sources, and analysis that the Census Bureau is examining to fulfill the Executive Order are insufficient, as discussed below.

B. Reliance on Administrative Records to Exclude Undocumented Immigrants from the Apportionment Count is Not Sufficient for the 2020 Apportionment Count.

It is my opinion that it is not currently feasible for the Census Bureau to produce estimates of undocumented immigrants from administrative records that would be of sufficient quality to use as a basis to exclude undocumented immigrants from the 2020 apportionment count. To date, administrative record usage for purposes of enumerating households is limited to those nonresponding addresses where the Census Bureau has multiple "high-quality" administrative records available.[105] More importantly, the Census Bureau does not use administrative records *on their own*—administrative records are used only after giving the entire population an opportunity to self-respond and after an attempt to enumerate the household by field staff.[106]

[105] 2020 Census Operational Plan.
[106] Memorandum from Deborah M. Stempowski to The Record Regarding Use of Administrative Records in the 2018 End-to-End Census Test (Mar. 26, 2018), 7.

Although administrative records are being used to fulfill President Trump's executive order to produce block-level citizen voting age population estimates,[107] administrative records lack the coverage, accuracy, and reliability needed to produce an actual enumeration of the undocumented population, which would be necessary to exclude undocumented immigrants from the 2020 apportionment count. Specifically, as I explain below, (1) very few administrative records directly identify those individuals with undocumented status, and the few that do so are fundamentally flawed; and (2) administrative records that may theoretically be used to estimate the number of undocumented immigrants lack sufficient coverage, accuracy, and reliability for this purpose.

1. Direct Identification of Undocumented Immigrants from Administrative Records is Not Feasible.

Very few administrative records directly identify those with undocumented status. Indeed, administrative records are "weak in their coverage of undocumented aliens because programs typically require documentation that many undocumented aliens do not have."[108] The limited records available with respect to undocumented immigrants, described below, are woefully deficient because they are incomplete, outdated, and often inaccurate.

i. Administrative records from the Department of Justice

The Census Bureau is unable to attain a precise number of individuals who entered the country undetected, because it is likely to only have records for those individuals who are apprehended.[109] The Census Bureau expects to receive administrative records about

[107] *See generally* 84 Fed. Reg. at 33,891.
[108] Czajka, J. L. (2013). Can administrative records be used to reduce nonresponse bias? The ANNALS of the American Academy of Political and Social Science, 645(1), 171-184.
[109] Some research has attempted to roughly estimate this number by using annual number of apprehensions and estimating the probability that an undocumented migrant is apprehended along the U.S. Mexico border to produce an estimate of the number undocumented migrants from Mexico (e.g., Massey and Singer 1995). These estimates, however, only speak to migration across the Mexico border.

incarcerations and apprehensions of undocumented immigrants from the Department of Justice ("DOJ"),[110] but the most recent report (Alien Incarceration Report, Fiscal Year 2018 Q2, April 16, 2019) summarizing those records report only 43,519 individuals.[111] This is surely a far cry from the total number of undocumented immigrants in the country.

Scrutiny of these DOJ records also highlights the difficulty of obtaining complete, accurate, and timely information—even among those in federal custody. The report notes that an additional 16,426 individuals—27.4% of all "known or suspected aliens" in federal custody—were still under investigation by Immigration and Customs Enforcement to determine alienage, and many others are difficult to classify: 1,281 were legally present and undergoing removal proceedings, 1,100 were granted relief or protection from removal, and 4,903 were deemed undocumented but under adjudication.[112] If determination of undocumented status is difficult for Immigration and Customs Enforcement, the Census Bureau cannot be expected to make such determinations with incomplete and deficient administrative records.

Finally, it is worth noting the time lag of about a year from the date of the incarceration data to the report's release. Specifically, the April 16, 2019 report summarizes incarcerations as of the end of fiscal year 2018, Quarter 2. This is just one example of both the time it takes to process and analyze administrative records, and the fact that such records are outdated by the time they can be summarized. This lag in reporting—plus the large number of unresolved statuses—calls into question the ability of the Census Bureau to produce apportionment numbers that exclude undocumented immigrants in the required nine months from the date of the census.

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[110] *See* Background Sheet 2: Creating an Interagency Working Group and Established Agreement for New Data. The Department of Interior is also sharing records on security interactions, although scant information about the coverage or quality of these records is available.
[111] Alien Incarceration Report, Fiscal Year 2018 Q2 (April 16, 2019). https://www.justice.gov/opa/page/file/1154711/download.
[112] Alien Incarceration Report, 2.

ii. Administrative records from the Department of Homeland Security

The Census Bureau is unable to attain a precise number of individuals who have overstayed their visas because DHS records are similarly unreliable. DHS is providing the Census Bureau with Arrival/Departure Information System and Visa Data, but these data do not completely or accurately identify visa overstays.[113] Record-keeping challenges make it difficult to match arrival and departure records for the same person, which could result in erroneously counting as an overstayer someone who actually left the country.[114] Consider the enormity of the task—more than 47 million people visit the United States from abroad for tourism and business.[115] When departure records are incompletely collected by the airlines and transmitted to DHS, errors result. The land borders are even harder to track, since the ports of entry are primarily focused on screening incoming traffic rather than checking who is departing. More than 254 million people annually pass through the border checkpoints (nearly 700,000 travelers on a given day)—mostly individuals who are legally able to "travel back and forth across the border for commercial trade, tourism, work, school, family visits or a simple trip to the store."[116] As admitted in the DHS Privacy Impact Assessment for the Immigration-Related Information Sharing with the U.S. Census Bureau: "Determining an individual's citizenship based on various DHS data is a challenging task . . . . Due to the decentralized nature of admission and immigration information, as well as the lack of a nationwide departure control system, [U.S.

[113] *See* Background Sheet 2: Creating an Interagency Working Group and Established Agreement for New Data.
[114] *See* https://thehill.com/opinion/immigration/447607-illegal-immigration-by-the-numbers-visa-violators-and-border-crossers.
[115] Morral, Anrew, Henry Willis, Peter Brownell. (2011). Measuring Illegal Border Crossing Between Ports of Entry: An Assessment of Four Promising Methods. Rand, Homeland Security and Defense Center. https://www.rand.org/content/dam/rand/pubs/occasional_papers/2011/RAND_OP328.pdf.
[116] Davis, Kristina. (April 7, 2019). "The impossible challenge of tracking visa overstays," The San Diego Union-Tribune. https://www.sandiegouniontribune.com/news/immigration/story/2019-04-06/the-impossible-challenge-of-tracking-visa-overstays.

Customs and Border Protection] collects different data points from different data set."[117] As a result, the classification of an individual as an overstayer is often inaccurate. Indeed, research by the Center for Migration Studies found nearly half the visa overstayers identified by DHS had likely left the U.S. unnoticed.[118] Others have emphasized that the data are quickly out of date because "many overstayers leave or adjust their status within a few months of their visa expiration date."[119] In the Memorandum of Agreement to share this data with the Census Bureau, DHS acknowledges that the shared information "is assumed to be accurate at the time it was collected. However, because DHS is providing information at a point in time, it is reasonable to believe that eventually data accuracy issues may arise."[120]

iii. Additional records with respect to undocumented status

In addition to the records described above, a handful of administrative records may have some information with respect to small groups of undocumented immigrants. One group with administrative records that identify immigrants without formal legal status are those with Deferred Action for Childhood Arrivals ("DACA") status, and who may be considered by some to fall under the category of "undocumented."[121] DACA recipients do not have formal legal status, but they are currently protected from deportation, and retain lawful presence in the U.S. Administrative records also exist for undocumented immigrants with pending asylum cases. The Census Bureau has not, however, requested DACA or records with respect to pending asylum

[117] Department of Homeland Security. (Dec. 20, 2019). Privacy Impact Assessment for the Department of Homeland Security Immigration-Related Information Sharing with the U.S. Census Bureau, 6.
[118] Warren, Robert (February 27, 2019). Sharp Multiyear Decline in Undocumented Immigration Suggests Progress at US-Mexico Border, Not a National Emergency. https://cmsny.org/publications/essay-warren-022719/
[119] Fazel-Zarandi, Feinstein, Kaplan 2018.
[120] Memorandum of Agreement Between the U.S. Department of Commerce, U.S. Census Bureau and United States Department of Homeland Security Regarding the Transfer of Immigration and Citizenship Related Data, 6.
[121] To be eligible, individuals needed to have arrived in the U.S. before turning 16 and must meet education and other related requirements.

cases.[122] In any event, both of these groups represent a tiny part of the undocumented population.

In sum, the limited number of administrative records that identify undocumented status mean it is impossible to directly enumerate the undocumented population from available administrative records.

2. Indirect Identification of Undocumented Immigrants from Administrative Records is Not Feasible.

The Census Bureau is also unable to produce an accurate and reliable enumeration of the undocumented population by indirectly estimating the undocumented immigrant population through a process of elimination based on information in administrative records. Doing so requires correct identification of citizens and the lawful non-citizen immigrant population—those persons granted lawful permanent residence, persons granted asylum, persons admitted as refugees, and persons admitted as nonimmigrants under classes of admission associated with residence (e.g., students and temporary workers, as opposed to tourists) and with authorized periods of admission in the future of any estimated date.[123]

Here, again, administrative records lack the necessary coverage, accuracy, and reliability to produce high quality estimates. Regarding the estimation of citizenship status, John Abowd, Chief Scientist of the Census Bureau, acknowledges that the Census Bureau "will most likely never possess a fully adequate truth deck to benchmark to."[124] Determining the specific legal

[122] *See* Background Sheet 2: Creating an Interagency Working Group and Established Agreement for New Data.
[123] Alabama has not clearly explained how to handle so-called quasi-legal cases, such as foreign nationals granted Temporary Protected Status (TPS) because they are from countries in which they cannot return home safely or those with DACA status, who have work authorization and protection against deportation. Pew includes in the authorized immigrant estimates those with temporary protection from deportation under DACA, TPS, and pending asylum cases. This would mean that a resident with 18-month temporary protected status (that could be extended) would be excluded from political representation but a student or temporary worker on a 12-month visa would be included.
[124] Memorandum from John M. Abowd, Chief Scientist & Assoc. Dir. for Research & Methodology, U.S. Census Bureau, to Wilbur L. Ross, Sec'y, U.S. Dep't of Commerce (Mar. 1, 2018).

status (undocumented or otherwise) among immigrants is even more difficult. DHS admits that "immigration status information is challenging, complicated, and dynamic . . . . No one source of citizenship information is complete and up-to-date"[125] In another report, DHS acknowledges, "while Census and DHS data provide a wealth of information on the total foreign-born population broken down by citizenship and on annual migration flows and status changes, national population data on the major subcategories of non-citizens, including lawful permanent residents, students, temporary workers, and unauthorized immigrants, are not readily available from any source and must be estimated."[126]

Below, I will show how the Census Bureau's most complete source of citizenship, the Numident, is inadequate, and then I will demonstrate that the other administrative records that the Bureau could consider using to fill the gaps in data are also insufficient.

i. The Numident

The Census Bureau's most complete source of citizenship data is the Census Numident file, a record of individual applications for Social Security cards and any changes subsequently made (such as change of name).[127] In an effort to evaluate the potential use of administrative records to estimate the citizenship status for the 2020 Census, the Census Bureau undertook extensive research evaluating the strengths and weaknesses of Numident. These results were reported in a 2018 white paper titled, "Understanding the Quality of Alternative Citizenship Data Sources for the 2020 Census" (hereinafter, "The Brown Memo"). As the Census Bureau found, there are several sources of error in these records. First, there will be individuals enumerated in the 2020 census who will not have information in the Numident. While this is more likely

[125] *See* Department of Homeland Security. (Dec. 20, 2019). Privacy Impact Assessment for the Department of Homeland Security Immigration-Related Information Sharing with the U.S. Census Bureau.
[126] *See* https://www.dhs.gov/sites/default/files/publications/lpr_population_estimates_january_2015.pdf, 2.
[127] See Layne, Wagner, and Rothaas (2014) and NORC (2011). Also Rastogi and Ohara (2012), Bond et al. 2014.

among undocumented immigrants, citizens and non-citizens with formal legal status can also be missing because of linkage errors, or incomplete identifying information provided by the household.[128] Of those enumerated in the 2010 census, the Brown Memo reports that 89.4% could be matched to the Numident file.[129]

A second issue is that some individuals in Numident have missing information about citizenship status. In 2017, 6.6 million persons born outside the U.S. have blank citizenship among those born in 1920 or later with no year of death.[130] Some of the individuals missing citizenship status could be undocumented immigrants, but a much higher share appear to be U.S. citizens.[131] The Brown Memo outlines the different groups of people who could have missing citizenship status in Numident, as follows:

1. U.S. citizens from birth with no Social Security number or U.S. passport;
2. U.S. citizens from birth born outside the U.S., who do not have a U.S. passport, and either applied for a Social Security number prior to 1974 and were 18 or older or applied before the age of 18 prior to 1978;
3. U.S. citizens who were automatically naturalized if they were under the age of 18 when their parents became naturalized in 2000 or later, and they did not inform USCIS or receive a U.S. passport;

[128] The internal unique person identifier is called the protected identification key or PIK.
[129] Brown et al, 14 (as reported, 91% can be assigned a PIK; once assigned, 98.2% could be matched to Numident).
[130] *See* https://www.supremecourt.gov/DocketPDF/18/18-966/91016/20190306200155135_18-966%20Commerce%20J.A.pdf, 153. In total, 20.0 percent of 2010 Numident records have missing citizenship status, but some of those will not be in the 2020 Census—either because they no longer reside in the U.S. (e.g., those who had temporary work status), or because they fail to respond.
[131] Memorandum from John M. Abowd, Chief Scientist & Assoc. Dir. for Research & Methodology, U.S. Census Bureau, to Wilbur L. Ross, Sec'y, U.S. Dep't of Commerce (Mar. 1, 2018).

4. U.S. citizens who were naturalized prior to 2001 and did not inform the Social Security Administration of their naturalization and had never applied for a Social Security number; and
5. Lawful permanent residents (LPR) who received that status prior to 2001 and had never applied for a Social Security number. [132]

The reason for the gap in citizenship status information is related to the history of the Social Security number, which was not created to track citizenship status, but rather created for the sole purpose of tracking earnings for use in determining benefit levels. Evidence of citizenship was not added to the Social Security application until 1974. Now, parents typically apply for an infant's Social Security number at the hospital where the infant is born, but there was variation across states in the rollout of this enumeration-at-birth ("EAB") program, which potentially resulted in geographic variation in the accuracy of the data.[133] For example, New Mexico, Indiana, and Iowa were early adopters of EAB in 1987, while California, Rhode Island, and Connecticut did not participate in EAB until 1995.[134] This means that late adopting states could be more likely to have citizens with missing citizenship status in Numident, potentially leading to their exclusion from apportionment numbers.

A third issue is inaccuracies in Numident. There are a number of cases where Numident indicates a person is a non-citizen, but the individual is in fact a citizen. This includes U.S. citizens who were naturalized prior to 2001 and who did not inform the Social Security Administration of their naturalization. Similarly, lawful permanent residents who received that

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[132] Brown et al., 19.

[133] *See* https://www.ssa.gov/policy/docs/ssb/v69n2/v69n2p55.html.
Today, over 90 percent of parents use the EAB process, which is offered in all 50 states plus Puerto Rico and the District of Columbia. The Social Security Administration receives nearly three-quarters of original Social Security number applications through the EAB process and issues over 4 million Social Security numbers via EAB each year (Social Security Administration 2006).

[134] *See* https://www.ssa.gov/policy/docs/ssb/v69n2/v69n2p55.html.

status prior to 2001 and had applied for a Social Security number prior 1974 would also have inaccurate data. Of course, there can also be inaccuracies in which a non-citizen is listed as a citizen. According to a 2005 GAO report, the Social Security number system had quality control issues for many years.[135] Audits during the 2000s found widespread misuse, with millions of workers showing mismatches.[136]

In sum, Numident lacks coverage of the entire population, and missing citizenship in Numident is not a clear indication of undocumented status. The Census Bureau is receiving other administrative records from federal agencies and state governments to supplement Numident, but they do not completely fill in the gaps, as explained below. Moreover, these administrative records can introduce inconsistencies across data sources that have to be reconciled, as also explained below.

ii. Other administrative records

DHS offers the most complete information about legal non-citizens, but the records it is providing to the Census Bureau are still inadequate for the purpose of apportionment. DHS is providing the Census Bureau with the Lawful Permanent Resident File, Naturalization Data from the Citizen and Immigration Services, and Arrival/Departure Information System and Visa Data.[137] As outlined when discussing Pew's residual method, these records are incomplete and often outdated, and can only partially address Numident's weaknesses.[138] For example, these data "do not cover naturalizations occurring before 1988 . . . and do not always cover children under 18 at the time a parent became a naturalized U.S. citizen."[139] As another example, the

[135] *See* https://www.govinfo.gov/content/pkg/GAOREPORTS-GAO-05-115/html/GAOREPORTS-GAO-05-115.htm.
[136] *See* July 2004 OIG report, 25
[137] *See* Background Sheet 2: Creating an Interagency Working Group and Established Agreement for New Data.
[138] Memorandum from John M. Abowd, Chief Scientist & Assoc. Dir. for Research & Methodology, U.S. Census Bureau, to Wilbur L. Ross, Sec'y, U.S. Dep't of Commerce (Mar. 1, 2018).
[139] Brown et al., 18.

Worldwide Refugee Admission Processing System for the Department of State contains only some of the asylum cases.[140]

Other administrative records that the Census Bureau currently plans to use have considerable variability in availability and coverage across states. For example, Medicaid/Children's Health Insurance Program data from the Department of Health and Human Services ("HHS") has "some citizenship information potentially available."[141] However, Census Bureau research finds that the availability of HHS varies widely across states.[142] A similar issue arises in the use of state Department of Motor Vehicle ("DMV") records. The Census Bureau has requested DMV data, including with respect to citizenship status and eye color, but the citizenship data can be inaccurate.[143] For example, when Florida and Texas attempted to purge registered voters who were identified as having been noncitizens when they applied for the driver licenses from voter rolls, they found that most were naturalized citizens who had outdated information in DMV records.[144]

Finally, any reliance by the Census Bureau on commercial data (i.e. CoreLogic data) cannot fill the gaps.[145] CoreLogic fails to provide full coverage of the population and its availability and accuracy varies across states. Households of higher socioeconomic status are better represented among linked CoreLogic records than are households of lower socioeconomic

[140] Applicants obtain asylum in one of two ways: affirmatively through a USCIS asylum officer, or defensively in removal proceedings before an immigration judge of DOJ's Executive Office for Immigration Review. The database only contains state of residence information for those receiving affirmative asylum.
[141] *See* Background Sheet 2: Creating an Interagency Working Group and Established Agreement for New Data.
[142] Brown et al. 2018, 14.
[143] Wang, Hansi Lo. (November 20, 2019). Nebraska Is 1st State To Share Driver's License Records With Census Bureau. https://www.npr.org/2019/11/20/781373128/nebraska-1st-to-say-it-will-share-drivers-license-records-with-census-bureau.
[144] Lopez, Ashley. (February 14, 2019). There's No Easy Way For Texas To Vet Its List Of Alleged Noncitizen Voters. Just Ask Florida. National Public Radio Kut 90.5. https://www.kut.org/post/theres-no-easy-way-texas-vet-its-list-alleged-noncitizen-voters-just-ask-florida.
[145] *See* https://www.federalregister.gov/documents/2018/06/08/2018-12365/proposed-information-collection-comment-request-2020-census.

status.[146] Even more importantly, research finds that the availability and quality of these data vary across states, raising concerns about distributional accuracy.[147] One study evaluating the potential for commercial data in the 2020 census found that "the quality of the CoreLogic data varies between counties and townships around the country, both in the coverage of the CoreLogic data and in the correspondence between ACS and CoreLogic property tax values."[148]

Such variation in data availability and accuracy across states raises concerns about the fairness or distributional accuracy of the resulting population counts. The Census Bureau will have far more information available about the population of some states compared to others. As of this writing, for example, only Nebraska had provided DMV data to the Census Bureau.[149] Asymmetries in information about state populations could make it easier or harder to identify and exclude undocumented persons from apportionment populations. Consider, for instance, that some states, but not others, allow undocumented immigrants to obtain driver's licenses. To the extent those DMV records improve the ability to identify undocumented immigrants in a state, it will increase the chance that those states will be more likely to have undocumented immigrants identified and excluded from their apportionment total, jeopardizing the distributional accuracy of the resulting apportionment count.

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[146] Bond, B., Brown, J. D., Luque, A. & O'Hara, A. (2014). The nature of the bias when studying only linkable person records: Evidence from the American Community Survey. CARRA Working Paper #2014-08. Washington, D.C.: U.S. Census Bureau. https://www.census.gov/content/dam/Census/library/working-papers/2014/adrm/carra-wp-2014-08.pdf. Similarly, Brummet (2014) found that 63.4 percent of records could be linked to the Master Address File, but the number varied across structure type—just 14.8 percent of multi-unit structure were linked, compared to 79 percent of single-unit structures. Brummet, Q. O. (2014). Comparison of survey, federal, and commercial address quality. CARRA Working Paper #2014-06. Washington, D.C.: U.S. Census Bureau. https://www.census.gov/content/dam/Census/library/working-papers/2014/adrm/carra-wp-2014-06.pdf.

[147] Moore, B. (2015). Preliminary research for replacing or supplementing the year built question on the American Community Survey with administrative records. Washington, D.C.: U.S. Census Bureau. https://www.census.gov/library/working-papers/2015/acs/2015_Moore_02.html.

[148] Seeskin, Z. H. (2016). Evaluating the Use of Commercial Data to Improve Survey Estimates of Property Taxes (No. 2016-06). Center for Economic Studies, US Census Bureau, 5.

[149] The Census Bureau reports that they had reached verbal agreements with about 1/3 of states. *See* Deposition Transcript of Karen Battle. (Mar. 2, 2020), 175, 201-02.

In sum, it is not possible to conduct an actual enumeration of the undocumented population using administrative records given their incomplete coverage of the population. Very few administrative records provide timely and accurate information about legal status. As a result, administrative records cannot be used to directly enumerate the population, and so any attempt to produce a count of the undocumented population for purposes of exclusion from the 2020 apportionment count would require extensive statistical modeling. In the next section, I explain how this modeling would differ in fundamental ways from that previously used to enumerate the apportionment population, and would result in a less accurate and reliable population enumeration.

C. Statistical Modeling to Exclude Undocumented Immigrants From the 2020 Apportionment Count Would Result in a Less Accurate and Reliable Enumeration.

It is my opinion that the use of statistical modeling to exclude undocumented immigrants would result in a less accurate and reliable enumeration. Below, I (1) explain how current statistical methods used in the enumeration process fundamentally differ from what would be required to estimate an apportionment population that excludes undocumented immigrants; and (2) explain why, in light of the Census Bureau Standards, implementation of any such statistical model would not be feasible for the 2020 apportionment count.

I start by first outlining what the Census Bureau currently plans with respect to estimating citizenship status to produce CVAP because that informs my understanding of the type of statistical modeling that might be considered, although I note that CVAP is not clearly being developed for the purpose of apportionment.[150] Given the shortcomings of available

[150] Trump's executive order calls for identification of citizenship status for states to use for "districting purposes," while acknowledging that it might not be permissible: "Whether that approach is permissible will be resolved when a State actually proposes a districting plan based on the voter-eligible population." 84 Fed. Reg. at 33,824. To date, no states have actually requested the data.

administrative records, explained above, the Census Bureau also must use modeling to estimate CVAP. Although the exact methodology for doing so has not been finalized, documents indicate that a model will be estimated for each person in the census "using the most current citizenship status from each available citizenship source for the person, as well as the person's other demographic, household, and location information as explanatory variables."[151] I presume that any model to estimate legal status would rely on a similar model specification.

1. The Extent of Any Planned Statistical Modeling to Exclude Undocumented Immigrants is Fundamentally Different than the Census Bureau's Current Uses of Statistical Modeling in Apportionment.

The current statistical methods used by the Census Bureau to address missing and erroneous values in the census include data editing and imputations. Data editing is the process of identifying missing, invalid, or inconsistent entries, and changing the entries according to checks of logical relationships.[152] For example, an individual who leaves blank the age question on the census form but completes information with respect to her date of birth would have age filled in through the process of editing. Statistical imputation is the process of filling in missing or conflicting values with a substitute. To produce population numbers from the decennial census, deterministic hot-deck count imputation is used in the small number of cases when an individual or a household does not answer a question, or when a household is not enumerated through self-completion or the Census Bureau's NRFU process, as described above.[153] The hot-

[151] *See* Department of Homeland Security (Dec. 20, 2019). Privacy Impact Assessment for the Department of Homeland Security Immigration-Related Information Sharing with the U.S. Census Bureau.
[152] This is sometimes called logical imputation. Editing can also rely on recontacts with the respondent or reliance on other data sources.
[153] Earlier in the data collection process, modeling on the basis of administrative records is used, for example, in the creation of the MAF and in the determination of a household as occupied or vacant. Count imputation occurs when the Census Bureau is unable to get information about an address in the MAF: (1) when records indicate housing unit is occupied but did not have number of residents; (2) when records say a housing unit exists, but they are unclear whether occupied or vacant, then the Bureau imputes both information with respect to if occupied and household size; (3) status imputation: if unclear if a unit exists, then impute if occupied, vacant, or nonexistent and then

deck procedure uses contemporaneous data from neighboring housing units to fill in deterministic values for the missing information.[154]

The nature of the statistical modeling that would be required for estimating legal status fundamentally differs from the statistical modeling currently used in producing population numbers for apportionment in several ways. First, excluding undocumented immigrants from the apportionment population requires imputing not just the household count, but also the characteristics (namely, citizenship status and legal status) of the household. As explained above, the Census Bureau currently produces apportionment numbers from the CUF, which only relies on count imputation. Characteristic imputation occurs in the CEF as a separate process, after the final population count is established and for the purposes of redistricting and other data tabulations.[155]

Second, the scope of any statistical modeling required to estimate the number of undocumented immigrants would be unprecedented for use in enumerating the apportionment population. For example, in 2010, 0.39% (less than one half of one percent) of the total population was added via count imputation; in 2000, 0.43% of total population was added using count imputation.[156] In other words, count imputation is used sparingly, and only after giving the entire population an opportunity to self-respond, and attempting to enumerate through NRFU.[157]

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household size. For official statistics beyond apportionment numbers, the Census Bureau also conducts characteristic imputation, in which the characteristics of the household are imputed using hot-deck methods.

[154] In contrast, a cold-deck imputation procedure would use information from outside sources.

[155] Memorandum from Deborah M. Stempowski to The Record Regarding Use of Administrative Records in the 2018 End-to-End Census Test (Mar. 26, 2018), 8.

[156] *See* https://www.pewsocialtrends.org/2011/05/04/imputation-adding-people-to-the-census/.

[157] Relatedly, the Census Bureau acknowledges in the 2020 Operational Plan that "[t]he accuracy and usefulness of the data collected for the 2020 Census are dependent upon the ability to obtain information from the public, which is influenced partly by the public's perception of how well their privacy and confidentiality concerns are being addressed . . . . If a substantial segment of the public is not convinced that the Census Bureau can safeguard their response data against data breaches and unauthorized use, then response rates may be lower than projected, leading to an increase in cases for follow-up and cost increases." For review of research on this topic, *see* U.S. Census Bureau, Privacy Research in Census 2000, Census 2000 Topic Report No. 1 (2003).

In contrast, estimation of the apportionment population excluding undocumented immigrants requires extensive modeling to account for gaps and inconsistencies in administrative records. With almost no administrative records directly identifying undocumented persons, the Census Bureau would need to impute the vast majority of the population to be excluded. The Census Bureau also acknowledges the inaccuracy of the models for those in the 2020 Census who are unable to be linked to administrative records. These individuals will have their citizenship probability "estimated based on local area information and the person's demographic characteristics, but not the person's citizenship, which makes the estimate much less accurate."[158]

Third, the shortcomings of the inputs to any model to estimate undocumented status would seriously implicate the accuracy of the outputs to such a model. All of the issues outlined above regarding the accuracy, reliability, and timeliness of administrative records will impact the predictive accuracy of the model results. Census research acknowledges that the modeling of missing information on citizenship will be challenging, with the accuracy of the models "not known."[159] Critically, the concern is not just with the accuracy and reliability of information about citizenship and legal status in administrative records, but also the other information from the administrative records that might be used in building the predictive model—such as race, ethnicity, sex, age, or country of origin.[160] If there are errors in the other explanatory variables, the model results can be biased and unreliable.

[158] Memorandum of Agreement Between the U.S. Department of Commerce, U.S. Census Bureau and United States Department of Homeland Security Regarding the Transfer of Immigration and Citizenship Related Data, 17.
[159] Brown et al, 44.
[160] As explained in Memorandum of Agreement Between the U.S. Department of Commerce, U.S. Census Bureau and United States Department of Homeland Security Regarding the Transfer of Immigration and Citizenship Related Data, 17: "A model will be estimated for each person using the most current citizenship status from each available citizenship source for the person, as well as the person's other demographic, household, and location information as explanatory variables."

Specifically, one key input of concern is the quality of the measures of race and ethnicity in administrative records. The quality of the race and ethnicity data in Numident is poor.[161] The race data included in the Numident file is collected at the time an application is made to obtain a Social Security number. Prior to 1980, the application form only permitted the racial categories of white, black, and other.[162] Individuals added to Numident through state vital records (the EAB program)—roughly one-fourth of the population—are typically missing race entirely because states do not transfer that information.[163] Also problematic is that Hispanic origin data are indirectly estimated through country of birth—a flawed assumption given that Hispanics often select more than one race or "some other race."[164] Given the problems with Hispanic ethnicity in Numident, census research has warned that statistical imputation could result in "bias in the resulting proportion of persons who are Hispanic," which could, in turn, bias estimates of citizenship and legal status.[165]

Finally, there are critical unanswered questions about how unverifiable modeling assumptions will be translated into any model results that would be used to exclude individuals from apportionment counts. The modeling of legal status seems likely to follow the same modeling strategy taken for estimating citizenship status, in which the planned model will result

[161] The Census Bureau has built an internal Best Race and Hispanic Origin file, a composite from various government and commercial sources that uses a rules-based approach to resolve unique race and Hispanic origin codes for person records where those values vary across different files. Unfortunately, the content and quality of this file "is mysterious to observers." Czajka, J. L. (2013). Can administrative records be used to reduce nonresponse bias?. The ANNALS of the American Academy of Political and Social Science, 645(1), 171-184.
[162] The current OMB race and ethnicity categories were not used until 1997.
[163] Czajka, J. L. (2013). Can administrative records be used to reduce nonresponse bias?. The ANNALS of the American Academy of Political and Social Science, 645(1), 171-184.
[164] Czajka, J. L. (2013). Can administrative records be used to reduce nonresponse bias?. The ANNALS of the American Academy of Political and Social Science, 645(1), 171-184.
[165] Richard A. Griffin. (2014). "Issues Concerning Imputation of Hispanic Origin due to Administrative Record Enumeration for the 2020 Census," Proceedings of the Survey Research Methods Section, American Statistical Association, available at http://ww2.amstat.org/sections/srms/proceedings/y2014/Files/311893_88330.pdf.

in a probability of best citizenship status.[166] This means that the model output for each individual is a value that ranges from 0 to 1, where 0 would indicate a 0% chance of being a citizen and 1 would indicate a 100% chance of being a citizen, but where most values will fall somewhere in between. It is unclear, however, how the Census Bureau will decide on the threshold that will be used to classify an individual as a citizen or not based on their predicted probability.[167] Any appropriate rate of false positives and false negatives that would be considered acceptable in producing an apportionment population based on such probabilities are unclear. Indeed, a probabilistic model inherently implies error in the underlying data and clearly contravenes an actual enumeration of "whole number of persons in each State." And it is unclear how the uncertainty in the prediction will be accounted for in the enumeration count. What is clear, however, is that the resulting population count from the use of such probabilities will be less reliable than the existing method of counting the population, given that these modeling decisions will introduce uncertainty and bias into the resulting population numbers.

In sum, there are fundamental differences in the statistical modeling that would be necessary to produce apportionment populations excluding undocumented immigrants compared to the current use of statistical modeling in the enumeration process. The nature and scope of the statistical modeling required to produce estimates of undocumented immigrants from incomplete and outdated administrative records requires untested modeling approaches and unverified modeling assumptions that will inherently result in a population count that is less reliable and less accurate than the current enumeration methods.[168]

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[166] Memorandum of Agreement Between the U.S. Department of Commerce, U.S. Census Bureau and United States Department of Homeland Security Regarding the Transfer of Immigration and Citizenship Related Data, 17.

[167] For example, it is unclear if, say, a 50%, 70%, or 90% predicted chance of being a legal non-citizen would be considered sufficient for inclusion in the apportionment population.

[168] Additionally, any attempt to exclude the undocumented immigrant population from the apportionment count threatens the accuracy and reliability of the apportionment population by reducing cooperation with the decennial census. The very exercise of asking the Census Bureau to use administrative records beyond their originally

2. Any Implementation of a Statistical Model to Exclude Undocumented Immigrants from the 2020 Apportionment Count is Not Feasible in the Limited Available Time.

The Census Bureau's Statistical Quality Standards govern the development and implementation of statistical methods in the design, collection, and dissemination of census products. These standards require an explicit plan that addresses (1) requirements for the editing and imputation systems; (2) verification and testing of the editing and imputation systems; and (3) monitoring and evaluation of the quality of the editing and imputation operations.[169] To date, there is no indication that sufficient planning and evaluation of the statistical modeling required to estimate an apportionment population that excludes undocumented immigrants has occurred, and there is likely not time for it to occur prior to December 31, 2020. It is telling to consider the time typically required to produce estimates of undocumented populations. For example, the most recent DHS estimate of the undocumented population—from December 2018—reports on numbers considered current as of July 2015.

With respect to the Census Bureau's timing, consider, as a point of comparison, that the Census Bureau began investigating methods for utilizing administrative records in NRFU operations shortly after the 2010 census. By the time the 2018 Operational Plan was drafted, the

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intended purpose to identify the legal status of the population will stoke fears about confidentiality and will undermine trust in the Census Bureau. As the former director of the Census John Keane explained: "If the Census Bureau were directed to enumerate undocumented aliens separately in order to remove them from the apportionment count, we would run the risk of being perceived as an enforcement agency . . . . The Census Bureau goes to great lengths to avoid misperception that could adversely affect cooperation. We must convince the population that it is safe to be included in the census." John G. Keane. Statement of the Director of the Bureau of the Census Before the Subcommittee on Energy, 5. Research shows that attitudes about privacy and confidentiality are strong predictors of census self-response—those individuals reporting higher levels of concern about the confidentiality of census data are less likely to return their census forms, more likely to skip individual questions, and more likely to provide inaccurate responses. *E.g.*, Singer, E., Mathiowetz, N. A., & Couper, M. P. (1993). The impact of privacy and confidentiality concerns on survey participation: The case of the 1990 U.S. census. Public Opinion Quarterly, 57, 465–482. Lower levels of self-response, in turn, increase the cost and reduce the quality of the census count. Brown, J. D., Heggeness, M. L., Dorinski, S. M., Warren, L., & Yi, M. (2019). Predicting the Effect of Adding a Citizenship Question to the 2020 Census. Demography, 56(4), 1173-1194.

[169] *See* https://www.census.gov/about/policies/quality/standards/standardc2.html.

use of administrative records had undergone years of research led by a team of census researchers (i.e. the Administrative Records Modeling Team), extensive testing in large-scale tests, engagement with stakeholders (e.g., I served on an administrative records working group for the Census Scientific Advisory Committee), publication and presentation in professional outlets, and significant revisions in light of the results of that research.[170] Such a process is simply not possible before apportionment population numbers are due to the President on December 31, 2020.

VI. Conclusion

To reiterate my opinions:

First, Dr. Poston does not demonstrate, to any degree of reasonable certainty, that Alabama will (a) lose a congressional seat because of the inclusion of undocumented immigrants in the 2020 apportionment count, or (b) maintain a congressional seat because of the exclusion of undocumented immigrants in the 2020 apportionment count.

Second, there is no reliable way to exclude undocumented immigrants from the 2020 apportionment count because (a) there is currently no reliable methodology or data product that the Census Bureau may use to do so; (b) no administrative records are of sufficient quality to use to exclude undocumented immigrants from the 2020 apportionment count; and (c) the nature, scope, and methodology of the statistical modeling needed to produce estimates of the undocumented population is fundamentally different from the statistical modeling currently used in producing the apportionment population, and would result in a less accurate and reliable enumeration.

[170] The final 2020 Census Operational Plan scaled back the plans to use administrative records compared to initial plans in the 2015 version 1.1. Operational Plan.

Executed on March 13, 2020 at Durham, NC.

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

D. Sunshine Hillygus, Ph.D

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D. SUNSHINE HILLYGUS

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hillygus@duke.edu

ACADEMIC APPOINTMENT

Duke University
Professor of Political Science, July 2015-
Professor of Public Policy (by courtesy), Nov 2015-
Associate Professor of Political Science, July 2009-2015
Director, Duke Initiative on Survey Methodology, July 2010-

Harvard University
Frederick S. Danziger Associate Professor of Government, July 2007-June 2009
Director, Program on Survey Research, July 2005-June 2009
Assistant Professor of Government, July 2003-June 2007

EDUCATION

Stanford University
Ph.D., Political Science, 2003
M.A., Political Science, 2000
Dissertation: Understanding Receptivity to Political Campaigns: Three Essays on Voter Decision Making in Election 2000.
Committee: Morris Fiorina (chair), Norman Nie, Simon Jackman, David Brady

University of Arkansas
M.A., Political Science, May 1998
B.A., Political Science and B.A., Spanish, *Summa Cum Laude*, May 1996

BOOKS

Holbein, J. and D.S. Hillygus. *Making Young Voters: Converting Civic Attitudes into Civic Action*. Cambridge University Press, 2020.

Hillygus, D.S. and T. Shields. *The Persuadable Voter: Wedge Issues in Presidential Campaigns*. Princeton University Press, 2008. Paperback, 2009.
Winner of the 2009 Robert E. Lane Award.
Excerpt reprinted in *Controversies in Voting Behavior*, 5th edition(2011).

Hillygus, D.S., N. Nie, K. Prewitt, and H. Pals. *The Hard Count: The Political and Social Challenges of Census Mobilization*. Russell Sage Foundation, 2006.

JOURNAL PUBLICATIONS

Bail, C.A., Guay, B., Maloney, E., Combs, A., Hillygus, D.S., Merhout, F., Freelon, D. and Volfovsky, A., 2020. Assessing the Russian Internet Research Agency's impact on the political attitudes and behaviors of American Twitter users in late 2017. *Proceedings of the National Academy of Sciences*, 117(1).

Madson, G. and D.S. Hillygus. 2019. "Who Trusts the Polls? Motivated Reasoning in Evaluations of Polling Results," *Political Behavior*.

Carlson, C., V. Dounoucos, and D.S. Hillygus. 2019. "The Message and the Medium: The Communication Effects of Twitter Commentary," *Journal of Information Technology & Politics*.

Holbein, J., D.S. Hillygus, C. Gibson-Davis, M. Lenard, and D. Hill. 2018. "The Development of Students' Engagement in School, Community, and Democracy," *British Journal of Political Science*.

Hillygus, D.S. 2018. "Navigating Scholarly Exchange in Today's Media Environment," *Journal of Politics* 80(3), 1064-1068(editor-reviewed).

Xing, Z. D.S. Hillygus and L. Carin. 2017. "Evaluating U.S. Electoral Representation with a Joint Statistical Model of Congressional Roll-Calls, Legislative Text, and Voter Registration Data," *Proceedings of the 23nd ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*, 1205-1214.

Knutson, K, J. Phelan, M. Paskow, A. Roach, K. Whiton, G. Langer; D.S. Hillygus, M. Mokrzycki, W.A. Broughton, S. Chokroverty, K.L. Lichstein, M. Hirshkowitz. 2017. "The National Sleep Foundation's Sleep Health Index," *Sleep Health* 3 (4): 234-40.

DeYoreo, M., Reiter, J. and D.S. Hillygus. 2017."Nonparametric Bayesian Models With Focused Clustering for Mixed Ordinal and Nominal Data," *Bayesian Analysis*.

Hillygus, D.S., McKee, S., and M. Young. 2017. "Reversal of Fortune: The Political Behavior of White Migrants to the South," *Presidential Studies Quarterly*.

Henderson, M. and D.S. Hillygus. 2016. "Contextual Factors in Time of Decision in the 2008 Presidential Election," *Public Opinion Quarterly*.

Holbein, J. and D.S. Hillygus. 2016. "Making Young Voters: The Impact of Preregistration on Youth Turnout," *American Journal of Political Science*.

Ballard, A., D.S. Hillygus, and T. Konitzer. 2016. "Campaigning Online: Web Display Ads in the 2012 Presidential Campaign," *PS: Political Science & Politics*.

Si, Y., J. Reiter, and D.S. Hillygus. 2016. "Bayesian Latent Pattern Mixture Models For Handling Attrition In Panel Studies With Refreshment Samples," *Annals of Applied Statistics*.

Schifeling, T. C. Cheng, J. Reiter and D.S. Hillygus. 2015. "Accounting for Nonignorable Unit Nonresponse and Attrition in Panel Studies with Refreshment Samples," *Journal of Survey Statistics and Methodology*.

Gerber, A., K. Arceneaux, C. Boudreau, C. Dowling, and D.S. Hillygus. 2015."Reporting Balance Tables, Response Rates and Manipulation Checks in Experimental Research: A Reply from the Committee that Prepared the Reporting Guidelines," *Journal of Experimental Political Science*.

Johnston, C., D.S. Hillygus, and B. Bartels. 2014. "Ideology, The Affordable Care Act Ruling, and Supreme Court Legitimacy," *Public Opinion Quarterly*, 78 (4): 963-973.

Gerber, A., K. Arceneaux, C. Boudreau, C. Dowling, D.S. Hillygus, T. Palfrey, D. Biggers, D. Hendry. 2014. "Reporting Guidelines for Experimental Research: A Report from the Experimental Research Section Standards Committee," *Journal of Experimental Political Science*, 1(1): 81-98.

Si, Y., J. Reiter and D.S. Hillygus. 2014. "Semi-parametric Selection Models for Potentially Non-ignorable Attrition in Panel Studies with Refreshment Samples," *Political Analysis*, 23(1): 92-112.

Frankel, L. and D.S. Hillygus. 2014. "Panel Attrition and the Survey Experience," *Political Analysis*, 22(3): 336-353.

Hillygus, D.S. and S. Treul. 2014. "Assessing Strategic Voting in the 2008 Presidential Primaries," *Public Choice*, 161(3): 517-536.

Aldrich, J., B. Bishop, R. Hatch, D.S. Hillygus, and D. Rohde. 2013. "Blame, Responsibility, and the Tea Party in the 2010 Midterm Elections," *Political Behavior*, 36(3), 471-491.

Deng, Y., D.S. Hillygus, J. Reiter, and Y. Si. 2013. "Handling Attrition in Longitudinal Studies: The Case for Refreshment Samples," *Statistical Science*, 28(2): 238-256.

Hillygus, D.S. 2011. "The Evolution of Election Polling in the United States," *Public Opinion Quarterly*, 75(5): 962-981.

Henderson, M. and D.S. Hillygus. 2011. "The Dynamics of Health Care Opinion, 2008-2010: Partisanship, Self-Interest, and Racial Resentment," *Journal of Health Politics, Policy, and Law*, 36(6): 945-960.

Henderson, M., D.S. Hillygus, and T. Tompson. 2010. "'Sour Grapes' or Rational Voting? Voter Decision Making Among Thwarted Primary Voters in 2008," *Public Opinion Quarterly*, 74(3): 499-529.

Ellis, R., D.S. Hillygus and N. Nie. 2010. "Retrospective and Prospective Candidate Evaluations and the Dynamics of Vote Choice in 2008," *Electoral Studies* 29(4): 582-593.

Hillygus, D.S. and M. Henderson. 2010. "Policy Issues and the Dynamics of Vote Choice in the 2008 Presidential Election," *Journal of Elections, Public Opinion, and Parties*, 20(2): 241-269.

Treier, S. and D.S. Hillygus. 2009. "The Nature of Political Ideology in the Contemporary Electorate," *Public Opinion Quarterly*, 73(4):679-703.

Burden, B. and D.S. Hillygus. 2009. "Opinion Formation, Polarization, and Presidential Reelection." *Presidential Studies Quarterly*, 39: 619-35.

Hillygus, D.S. and T. Shields. 2008. "Southern Discomfort? Regional Differences in Voter Decision Making in the 2000 Presidential Election," *Presidential Studies Quarterly*, 38(3): 506-520.

Hillygus, D.S. 2007. "The Dynamics of Voter Decision Making Among Minor Party Supporters: The 2000 U.S. Presidential Election," *British Journal of Political Science*, 37(2): 225-244.

Hillygus, D.S. 2005. "Campaign Effects and the Dynamics of Turnout Intention in Election 2000," *Journal of Politics*, 66(1): 50-68.

Hillygus, D.S. 2005. "The Missing Link: Exploring the Relationship between Higher Education and Political Behavior," *Political Behavior*, 27(1): 25-47.

Hillygus, D.S. and T. Shields. 2005. "Moral Issues and Voter Decision Making in the 2004 Presidential Election," *PS: Political Science and Politics*, 38(2): 201-10.
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Hillygus, D.S. and S. Jackman. 2003. "Voter Decision Making in Election 2000: Campaign Effects, Partisan Activation, and the Clinton Legacy," *American Journal of Political Science*, 47(4): 583-596.

Nie, N. and D.S. Hillygus. 2002. "Where Does Internet Time Come From?: A Reconnaissance," *IT & Society*, 1(2): 1-20.

Nie, N. and D.S. Hillygus. 2002. "The Impact of Internet Use on Sociability: Time-Diary Findings," *IT & Society*, 1(1): 1-29.

OTHER PUBLICATIONS

Zhou, J., D.S. Hillygus, and J. Aldrich. 2019. "Understanding the Trump Win: Populism, Partisanship, and Polarization in the 2016 Election," *Publications of the Bavarian American Academy*, Heidelberg University Press.

Guay, B. and D.S. Hillygus. 2018. "Online Public Opinion Polling," *Oxford Bibliographies*

Hillygus, D.S. and S. Snell. 2018. "Longitudinal Surveys: Issues and Opportunities," *Oxford Handbook on Polling and Polling Methods*. L. Atkeson and M. Alvarez, eds. New York: Oxford University Press.

Hillygus, D.S. and B. Guay. 2016. "The Virtues and Limitations of Election Polling in the United States," *Seminar Magazine*.

Hillygus, D.S. 2016. "The Practice of Survey Research: Changes and Challenges," *New Directions in Public Opinion*, second edition. Adam Berinsky, ed. Routledge Press.

Hillygus, D.S., N. Jackson, and M. Young. 2014. "Professional Respondents in Online Survey Panels," *Online Panel Research: A Data Quality Perspective*. M.Callegaro, R. Baker, P. Lavrakas, J. Krosnick, J. Bethlehem, and A. Göritz, eds.

Frankel, L. and D.S. Hillygus. 2014. "Niche Communication in Political Campaigns," *Oxford Handbook on Political Communication*. Kathleen Hall Jamieson and Kate Kenski, eds. New York: Oxford University Press.

Hillygus, D.S. and B. Burden. 2013. "Mass Polarization in the Bush Presidency," *The Presidency of George W. Bush: Perspectives on the Forty-Third President of the United States*, D. Kelly and T. Shields, eds. Texas A&M Press.

Hillygus, D.S. 2011. "The Practice of Survey Research: Changes and Challenges" *New Directions in Public Opinion*. Adam Berinsky, ed. Routledge Press.

Bishop, B. and D.S. Hillygus. 2011. "Campaigning, Debating, Advertising," *Oxford Handbook on Public Opinion and Media*. Larry Jacobs and Robert. Shapiro, eds. New York: Oxford University Press.

Hillygus, D.S. 2010. "Campaign Effects on Vote Choice," *Oxford Handbook on Elections and Political Behavior*. Jan Leighly and George C. Edwards III, eds. Oxford University Press.

Bishop, B., A. Cooper, and D.S. Hillygus. 2009. "Innovative Survey Methodologies for the Study of Attitudes Toward Terrorism and Counterterrorism Strategies," Institute for Homeland Security Solutions, Duke University.

Hillygus, D.S. 2009. "Guest Editor Introduction: Understanding the 2008 Presidential Election," *Public Opinion Quarterly* 73: 841-844.

Hillygus, D.S. 2009. "The Need for Survey Reporting Standards in Political Science," *The Future of Political Science: 100 Perspectives*, G. King, N. Nie, and K. Schlozman (eds).

Hillygus, D.S. 2008. "Internet and Politics 2008: Microtargeting," *The Publius Project*, The Berkman Center.

Hillygus, D.S. and T. Shields. 2008. "Moderation or Polarization in Candidates' Campaign Agendas?" *The Polling Report*, 24(15).

Hillygus, D.S. 2007. "Moral Values: Media, Voters, and Candidate Strategy," in *A Matter of Faith? Religion in the 2004 Presidential Election*, Brookings Institution Press.

Hillygus, D.S. 2004. Review of Models of Voting in Presidential Elections: The 2000 Election, H. Weisberg and C. Wilcox (eds), in *Presidential Studies Quarterly*, 34(3).

Brady, D. and D.S. Hillygus. 2004. "Assessing the Clinton Presidency: The Political Constraints of Legislative Policy" in *The Clinton Riddle: Perspectives on the 42nd President*, Shields, Whayne, and Kelley (eds). U of Arkansas Press.

Nie, N., D.S. Hillygus, and L. Erbring. 2003."Internet Use, Interpersonal Relations and Sociability: A Time Diary Study" in *The Internet in Everyday Life*, Wellman and Haythornthwaite (eds). Oxford: Blackwell Publishers.

Nie, N. and D.S. Hillygus. 2001. "Education and Democratic Citizenship," in *Making Good Citizens: Education and Civil Society*, Ravitch and Viteritti (eds). Yale University Press.

CURRENT PROJECTS

Valentino, N., K. Zhirkov, D.S. Hillygus, B. Guay. "Personality Differences between Face-to-Face and Online Samples," R&R, *Public Opinion Quarterly*.

Olanrewaju A., G. Madson, D.S. Hillygus and J. Reiter. "Leveraging Auxiliary Information on Marginal Distributions in Nonignorable Models for Item and Unit Nonresponse in Surveys," under review.

Lopez, J. and D.S. Hillygus. "Why So Serious?: Survey Trolls and Political Misinformation" available at SSRN.

Endres, K. D.S. Hillygus, and S. Snell, "Big Data, Big Problems: Overcoming Barriers to Consent for Data Linking."

HONORS/AWARDS

Duke University Howard D. Johnson Distinguished Teaching Award, 2019.

National Science Foundation, Political Science Program ($3.9m) "ANES Web: American National Election Study," (Co-PI with PI S. Iyengar), 2018-2021.

Provost "Together Duke" Initiative ($454,000), "Duke Polarization Lab" (Co-PI with K. Heller, J. Moody, G. Sapiro, A. Volfovsky and PI C. Bail), 2018-2019

National Science Foundation, Political Science Program, Grant SES-1657821 ($335,690), "Making Young Voters: Policy Reforms to Increase Youth Turnout" (PI with Co-PI J. Holbein) 2017-2019

National Science Foundation, MMS Program, Grant SES-1733835 ($300,000), "Leveraging Auxiliary Information on Marginal Distributions in Multiple Imputation for Survey Nonresponse" (Co-PI with PI J. Reiter) 2017-2019

Bass Connections, Education and Human Development grant ($23,000), 2017-2019

Facebook Academic Program gift ($25,000), 2016

National Science Foundation, Political Science Program, Grant SES-1416816 ($249,999), "Education, Engagement, and Well-being among Adolescents" (PI with Co-PI C. Gibson-Davis) 2014-2016

National Science Foundation, MMS Program, Grant SES-1131897 supplement ($199,000), "Conducting Research Using the Survey of Income and Program Participation (SIPP) Panel Study," 2013-2015

Information Initiative at Duke, Research Incubator Award ($75,000) "Using Big Data to Understand the American Electorate," (with L. Carin), 2013-2015

National Science Foundation, MMS Program, Grant SES-1131897 ($2,997,591), "Triangle Census Research Network" (Senior Co-Investigator with L. Cox, D. Dunson, J. Hotz, F. Li, and PI J. Reiter and Co-PI A. Karr), 2011-2016

National Science Foundation, MMS Program, Grant SES-1061241 ($160,000), "Multiple Imputation Methods for Handling Missing Data in Longitudinal Studies with Refreshment Samples." (with PI J. Reiter), 2011-2012

National Science Foundation, Political Science Program, SES-1110341"Balancing Innovation and Continuity in Longitudinal Surveys"($38,235), 2011

IHSS Award, Innovative Survey Methodologies($25,081), 2009

Robert E. Lane Award for best book published in political psychology in 2008

CAPS Junior Faculty Seed Grant ($5000), 2008

Shorenstein Center for Press and Politics Fellow, Fall 2005

Program on the Global Demography of Aging Grant ($17,130), 2005-06

Institute for Quantitative Social Science Research Grant ($10,000), 2005-06

Institutional Development Initiative ($10,000), 2005-06

Blair Center for Southern Politics, 2004 Election Survey Funding ($85,000)

CAPS Junior Faculty Seed Grant ($5000), 2004-2005

Milton Fund Grant, Harvard University ($3500), 2004-2005

Harvard University Cooke-Clark Grant ($6000)

Westview Paper Prize, 2003 Midwest Political Science Meeting

Heinz Eulau Political Behavior Fellowship, 2002-2003

Best Graduate Student Poster Award, 2002 Political Methodology Meeting

National Conference of State Legislators Women's Graduate Fellowship, 1998

PROFESSIONAL SERVICE

Associate PI, American National Election Study, 2018-2021
Associate Editor, *Political Analysis*, 2018-
Chair, POQ Advisory Committee, 2011-
Methods, Measurement, and Statistics Advisory Panel, National Science Foundation, 2018-2020
Board Member, American National Election Studies, 2010-2013, 2014-2017
Scientific Advisory Committee, U.S. Census Bureau, 2012-2018
Political Science Advisory Panel, National Science Foundation, 2010-2012
Member, Executive Council, Midwest Political Science Association, 2014-17
Member, Executive Council, Southern Political Science Association, 2014-17
Editorial Board, *American Political Science Review*, 2016-
Editorial Board, *Journal of Politics*, 2010-
Editorial Board, *Public Opinion Quarterly*, 2008-
Editorial Board, *Political Communication*, 2015-

Editorial Board, *Journal of Experimental Political Science*, 2013-
Editorial Board, *Political Behavior*, 2011-
Editorial Board, *Journal of Elections, Public Opinion and Parties*, 2008-
Editorial Board, *Political Science Network*, 2007-
Editorial Board, *The Forum*, 2011-
Editorial Board, *Political Analysis*, 2015-2017
Editorial Board, *American Journal of Political Science*, 2009-2012
Guest Editor, *Public Opinion Quarterly* 2009 Special Issue
AAPOR Journals Committee (2019)
APSA EPOVB Best Article in Political Behavior Award Committee (2019)
APSA Experimental Research Section: Reporting Standards Committee (2011)
APSA Political Meth Section: Nominations Committee (2010-2012), Diversity Committee (2005-08, 2011-12), Miller Prize (2017), Emerging Scholar (2018-2020)
SPSA, VO Key Award Committee, 2013
APSA Gladys M. Kammerer Award Committee, 2012
APSA Philip Converse Book Award Committee, 2009, 2010 and 2012
SPSA Program Committee, 2009 and 2012
JOP Best Paper Award Committee, 2011
AAPOR Book Award Committee, 2011, 2016

CONFERENCES ORGANIZED

International Total Survey Error Workshop (6/18)
Conducting Research Using the Survey of Income and Program Participation (SIPP) Panel Study, Durham, NC (2/14)
Balancing Innovation and Continuity in Longitudinal Surveys, Durham, NC (2/11)
Assessing Survey Quality, Cambridge, MA (4/09)
Surveying Multiethnic America, Cambridge, MA (4/07)
Advances in Questionnaire Design, Cambridge, MA (2/06)

Expert Witness Work

League of Women Voters v. State of North Carolina, Case No. 1:13-CV-660
NAACP et al. v. Bureau of the Census et al., Case No. 8:18-CV-00891
New York Immigration Coalition v. Dept. of Commerce, Case No. 18-CV-5025

INVITED PRESENTATIONS(last 5 years)

Plenary, Pacific Association of Public Opinion Research Meeting (12/19)
Massachusetts Institute of Technology (10/19)
Michigan State University (9/19)
Plenary, American Association of Public Opinion Research Meeting (5/19)
University of North Carolina (2/19)
Emory University (11/18)
Duke Alumni Association of Philadelphia (4/18)
Duke Alumni Association of Los Angeles (6/17)
Duke Alumni Association of Austin (6/17)
Duke Alumni Association of Denver (5/17)
Fordham University (4/17)
Qualtrics Innovation Summit, Salt Lake City (3/17)
Stanford Alumni Association, Durham (2/17)

Duke Alumni Association of San Diego (11/16)
Wake Forest University (11/16)
Reed College (10/16)
UNC-Wilmington (10/16)
Duke Alumni Association of North Texas (9/16)
Duke Alumni Association of Charlotte (5/16)
Dept of Political Science, MIT (4/16)
Center for the Study of Democratic Politics, Princeton (3/16)
Appalachian State University (3/16)
Computers, Privacy, and Data Protection Conference, Brussels (1/16)
Political Persuasion Conference, Laguna Beach, CA (1/16)
Duke Alumni Association of Tampa (1/16)
Keynote, Australian Society for Quantitative Political Science, Melbourne (12/15)
Dept of Communication, U. of Michigan (11/15)
Dept of Political Science, UNC-Greensboro (11/15)
Microsoft Panel on Campaign Technology, D.C. (11/15)
Political Science Dept, U. Texas (12/14)
ElectionsLive!, Duke University (11/14)
American Politics Research Group, UNC (11/14)
American Politics Workshop, UCLA (01/14)
The American Panel Survey Workshop, Wash U (11/13)
Intro to Survey Methods, Shanghai Jiao Tong University (06/13)
Senior Scholar Career Presentation, Visions in Methodology, FSU (04/13)
American Politics Workshop, Yale University (03/13)
Google Political Innovation Summit, New York (01/13)

DEPARTMENTAL AND UNIVERSITY SERVICE

Founding Director, Duke Initiative on Survey Methodology, 2010-
Associate Director, Institutional Review Board, Duke University, 2010-
Social Science Research Institute Steering Committee, 2011-
Duke Advisory Committee on Investment Responsibility, 2017-
EHD-Bass Connections Team Leader, 2017-2020
Standing Committee for Misconduct in Research, 2019-2022
Social Science Research Institute (SSRI) Director Search chair, 2018
Faculty Fellow, Duke Alumni Association, 2015-2018
POLIS steering committee, 2015-2017
Social Science Research Institute Planning Committee, 2012
Behavior and Identity Field Chair, 2011-2012, 2014, 2016-2018
Behavior and Identity Workshop Organizer, 2010-2012, 2016
American Politics Field Organizer, 2010-2012
REP Search Committee, Duke Political Science, 2013, 2017
China Search Committee, Duke Political Science, 2011
Graduate Admissions Committee, Duke Political Science, 2009, 2014
Undergraduate Curriculum Committee, Duke Political Science, 2009
Faculty Organizer, Duke Political Science Graduate Orientation, 2009
Harvard University Faculty Advisory Group for Metrics and Analysis, 2006-2009
Faculty Advisory Board for the Social Sciences, Harvard FAS, 2008-2009

Executive Committee, Center for American Political Studies, 2003-2009
Organizer, Political Psychology and Behavior Workshop, 2003-2008
Standing Committee on Women, Harvard FAS 2004-2005

EXHIBIT B

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ACADEMIC APPOINTMENT

Duke University
Professor of Political Science, July 2015-
Professor of Public Policy (by courtesy), Nov 2015-
Associate Professor of Political Science, July 2009-2015
Director, Duke Initiative on Survey Methodology, July 2010-

Harvard University
Frederick S. Danziger Associate Professor of Government, July 2007-June 2009
Director, Program on Survey Research, July 2005-June 2009
Assistant Professor of Government, July 2003-June 2007

EDUCATION

Stanford University
Ph.D., Political Science, 2003
M.A., Political Science, 2000
Dissertation: Understanding Receptivity to Political Campaigns: Three Essays on Voter Decision Making in Election 2000.
Committee: Morris Fiorina (chair), Norman Nie, Simon Jackman, David Brady

University of Arkansas
M.A., Political Science, May 1998
B.A., Political Science and B.A., Spanish, *Summa Cum Laude*, May 1996

BOOKS

Holbein, J. and D.S. Hillygus. *Making Young Voters: Converting Civic Attitudes into Civic Action*. Cambridge University Press, 2020.

Hillygus, D.S. and T. Shields. *The Persuadable Voter: Wedge Issues in Presidential Campaigns*. Princeton University Press, 2008. Paperback, 2009.
Winner of the 2009 Robert E. Lane Award.
Excerpt reprinted in *Controversies in Voting Behavior*, 5th edition (2011).

Hillygus, D.S., N. Nie, K. Prewitt, and H. Pals. *The Hard Count: The Political and Social Challenges of Census Mobilization*. Russell Sage Foundation, 2006.

JOURNAL PUBLICATIONS

Olanrewaju A., G. Madson, D.S. Hillygus and J. Reiter. forthcoming. "Leveraging Auxiliary Information on Marginal Distributions in Nonignorable Models for Item and Unit Nonresponse in Surveys," *Journal of the Royal Statistical Society A*.

Valentino, N., K. Zhirkov, and D.S. Hillygus, B. Guay. forthcoming "Personality Differences between Face-to-Face and Online Samples," *Public Opinion Quarterly*.

Spell, G., B. Guay, D.S. Hillygus, and L. Carin. forthcoming. "An Embedding Moel for Estimating Legislative Preferences from the Frequency and Sentiment of Tweets," *Proceedings of the 2020 Conference on Empirical Methods in Natural Language Processing*.

Hillygus, D. S., and J. Lopez. 2020. Easy as 1, 2, 3? Challenges of the 2020 Census and Implications for Political Science. *Journal of Political Institutions and Political Economy*, 1(2), 289-317.

Bail, C.A., B. Guay, E. Maloney, A. Combs, D.S. Hillygus, F. Merhout, D. Freelon, and A. Volfovsky, 2020. Assessing the Russian Internet Research Agency's impact on the political attitudes and behaviors of American Twitter users in late 2017. *Proceedings of the National Academy of Sciences*, 117(1).

Madson, G. and D.S. Hillygus. 2019. "Who Trusts the Polls? Motivated Reasoning in Evaluations of Polling Results," *Political Behavior*.

Carlson, C., V. Dounoucos, and D.S. Hillygus. 2019. "The Message and the Medium: The Communication Effects of Twitter Commentary," *Journal of Information Technology & Politics*.

Holbein, J., D.S. Hillygus, C. Gibson-Davis, M. Lenard, and D. Hill. 2018. "The Development of Students' Engagement in School, Community, and Democracy," *British Journal of Political Science*.

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OTHER PUBLICATIONS

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HONORS/AWARDS

The Henry and Bryna David Endowment Award and Lecture, National Academy of Sciences, 2020.

National Science Foundation, Accountable Institutions & Behavior Program ($39,778) "Workshop: Preparing for the Future of Survey Research," (co-PI with PI John Aldrich), 2020-2021.

Duke University Howard D. Johnson Distinguished Teaching Award, 2019.

National Science Foundation, Political Science Program ($3.9m) "ANES Web: American National Election Study," (PI S. Iyengar), 2018-2021.

Provost "Together Duke" Initiative ($454,000), "Duke Polarization Lab" (Co-PI with K. Heller, J. Moody, G. Sapiro, A. Volfovsky and PI C. Bail), 2018-2019

National Science Foundation, Political Science Program, Grant SES-1657821 ($335,690), "Making Young Voters: Policy Reforms to Increase Youth Turnout" (PI with Co-PI J. Holbein) 2017-2019

National Science Foundation, MMS Program, Grant SES-1733835 ($300,000), "Leveraging Auxiliary Information on Marginal Distributions in Multiple Imputation for Survey Nonresponse" (Co-PI with PI J. Reiter) 2017-2019

Bass Connections, Education and Human Development grant ($23,000), 2017-2019

Facebook Academic Program gift ($25,000), 2016

National Science Foundation, Political Science Program, Grant SES-1416816 ($249,999), "Education, Engagement, and Well-being among Adolescents" (PI with Co-PI C. Gibson-Davis) 2014-2016

National Science Foundation, MMS Program, Grant SES-1131897 supplement ($199,000), "Conducting Research Using the Survey of Income and Program Participation (SIPP) Panel Study," 2013-2015

Information Initiative at Duke, Research Incubator Award ($75,000) "Using Big Data to Understand the American Electorate," (with L. Carin), 2013-2015

National Science Foundation, MMS Program, Grant SES-1131897 ($2,997,591), "Triangle Census Research Network" (Senior Co-Investigator with L. Cox, D. Dunson, J. Hotz, F. Li, and PI J. Reiter and Co-PI A. Karr), 2011-2016

National Science Foundation, MMS Program, Grant SES-1061241 ($160,000), "Multiple Imputation Methods for Handling Missing Data in Longitudinal Studies with Refreshment Samples." (with PI J. Reiter), 2011-2012

National Science Foundation, Political Science Program, SES-1110341"Balancing Innovation and Continuity in Longitudinal Surveys"($38,235), 2011

IHSS Award, Innovative Survey Methodologies($25,081), 2009

Robert E. Lane Award for best book published in political psychology in 2008

CAPS Junior Faculty Seed Grant ($5000), 2008

Shorenstein Center for Press and Politics Fellow, Fall 2005

Program on the Global Demography of Aging Grant ($17,130), 2005-06

Institute for Quantitative Social Science Research Grant ($10,000), 2005-06

Institutional Development Initiative ($10,000), 2005-06

Blair Center for Southern Politics, 2004 Election Survey Funding ($85,000)

CAPS Junior Faculty Seed Grant ($5000), 2004-2005

Milton Fund Grant, Harvard University ($3500), 2004-2005

Harvard University Cooke-Clark Grant ($6000)

Westview Paper Prize, 2003 Midwest Political Science Meeting

Heinz Eulau Political Behavior Fellowship, 2002-2003

Best Graduate Student Poster Award, 2002 Political Methodology Meeting

National Conference of State Legislators Women's Graduate Fellowship, 1998

PROFESSIONAL SERVICE

Associate PI, American National Election Study, 2018-2021
Associate Editor, *Political Analysis*, 2018-
ASA Census Data Quality Indicators Task Force, 2020
AAPOR Task Force on 2020 Pre-Election Polling

Chair, POQ Advisory Committee, 2011-2020
Member, Committee on the Future of AAPOR Journals
Methods, Measurement, and Statistics Advisory Panel, National Science Foundation, 2018-2020
Board Member, American National Election Studies, 2010-2013, 2014-2017
Scientific Advisory Committee, U.S. Census Bureau, 2012-2018
Political Science Advisory Panel, National Science Foundation, 2010-2012
Member, Executive Council, Midwest Political Science Association, 2014-17
Member, Executive Council, Southern Political Science Association, 2014-17
Editorial Board, *American Political Science Review*, 2016-
Editorial Board, *Journal of Politics*, 2010-
Editorial Board, *Public Opinion Quarterly*, 2008-
Editorial Board, *Political Communication*, 2015-
Editorial Board, *Journal of Experimental Political Science*, 2013-
Editorial Board, *Political Behavior*, 2011-
Editorial Board, *Journal of Elections, Public Opinion and Parties*, 2008-
Editorial Board, *Political Science Network*, 2007-
Editorial Board, *The Forum*, 2011-
Editorial Board, *Political Analysis*, 2015-2017
Editorial Board, *American Journal of Political Science*, 2009-2012
Guest Editor, *Public Opinion Quarterly* 2009 Special Issue
AAPOR Journals Committee (2019)
APSA EPOVB Best Article in Political Behavior Award Committee (2019)
APSA Experimental Research Section: Reporting Standards Committee (2011)
APSA Political Meth Section: Nominations Committee (2010-2012), Diversity Committee (2005-08, 2011-12), Miller Prize (2017), Emerging Scholar (2018-2020)
SPSA, VO Key Award Committee, 2013
APSA Gladys M. Kammerer Award Committee, 2012
APSA Philip Converse Book Award Committee, 2009, 2010 and 2012
SPSA Program Committee, 2009 and 2012
JOP Best Paper Award Committee, 2011
AAPOR Book Award Committee, 2011, 2016

CONFERENCES ORGANIZED

Future of Survey Research, virtual (scheduled 1/2021)
International Total Survey Error Workshop, Durham, NC (6/18)
Conducting Research Using the Survey of Income and Program Participation (SIPP) Panel Study, Durham, NC (2/14)
Balancing Innovation and Continuity in Longitudinal Surveys, Durham, NC (2/11)
Assessing Survey Quality, Cambridge, MA (4/09)
Surveying Multiethnic America, Cambridge, MA (4/07)
Advances in Questionnaire Design, Cambridge, MA (2/06)

Expert Witness Work

League of Women Voters et al. v. State of North Carolina, No. 1:13-CV-660
New York Immigration Coalition et al. v. Dept. of Commerce, No. 18-CV-5025
NAACP, et al. v. Bureau of the Census et al., No. 8:18-CV-00891
State of Alabama v. U.S. Dept. of Commerce, No. 2:18-cv-00772-RDP

Common Cause et al. v. Donald J. Trump, et al., No. 1:20-cv-02023-CRC
National Urban League et al. v. Wilbur Ross, et al., No. 20-cv-5799-LHK

INVITED PRESENTATIONS(last 5 years)

Yale Quantitative Research Methods Workshop (10/20)
Australian National University, SPIR Research Seminar (10/20)
AAPOR New Books Launch (6/20)
Duke Women's Weekend Panel (2/20)
USA Symposium on Election Adminsitration and Technology (1/20)
Plenary, Pacific Association of Public Opinion Research Meeting (12/19)
Massachusetts Institute of Technology (10/19)
Michigan State University (9/19)
Plenary, American Association of Public Opinion Research Meeting (5/19)
University of North Carolina (2/19)
Emory University (11/18)
Duke Alumni Association of Philadelphia (4/18)
Duke Alumni Association of Los Angeles (6/17)
Duke Alumni Association of Austin (6/17)
Duke Alumni Association of Denver (5/17)
Fordham University (4/17)
Qualtrics Innovation Summit, Salt Lake City (3/17)
Stanford Alumni Association, Durham (2/17)
Duke Alumni Association of San Diego (11/16)
Wake Forest University (11/16)
Reed College (10/16)
UNC-Wilmington (10/16)
Duke Alumni Association of North Texas (9/16)
Duke Alumni Association of Charlotte (5/16)
Dept of Political Science, MIT (4/16)
Center for the Study of Democratic Politics, Princeton (3/16)
Appalachian State University (3/16)
Computers, Privacy, and Data Protection Conference, Brussels (1/16)
Political Persuasion Conference, Laguna Beach, CA (1/16)
Duke Alumni Association of Tampa (1/16)
Keynote, Australian Society for Quantitative Political Science, Melbourne (12/15)
Dept of Communication, U. of Michigan (11/15)
Dept of Political Science, UNC-Greensboro (11/15)
Microsoft Panel on Campaign Technology, D.C. (11/15)

DEPARTMENTAL AND UNIVERSITY SERVICE

Founding Director, Duke Initiative on Survey Methodology, 2010-
Associate Director, Institutional Review Board, Duke University, 2010-
Social Science Research Institute Steering Committee, 2011-
Duke Advisory Committee on Investment Responsibility, 2017-
EHD-Bass Connections Team Leader, 2017-2020
Standing Committee for Misconduct in Research, 2019-2022
Social Science Research Institute (SSRI) Director Search chair, 2018
Faculty Fellow, Duke Alumni Association, 2015-2018
POLIS steering committee, 2015-2017

Social Science Research Institute Planning Committee, 2012
Behavior and Identity Field Chair, 2011-2012, 2014, 2016-2018
Behavior and Identity Workshop Organizer, 2010-2012, 2016
American Politics Field Organizer, 2010-2012
REP Search Committee, Duke Political Science, 2013, 2017
China Search Committee, Duke Political Science, 2011
Graduate Admissions Committee, Duke Political Science, 2009, 2014
Undergraduate Curriculum Committee, Duke Political Science, 2009
Faculty Organizer, Duke Political Science Graduate Orientation, 2009
Harvard University Faculty Advisory Group for Metrics and Analysis, 2006-2009
Faculty Advisory Board for the Social Sciences, Harvard FAS, 2008-2009
Executive Committee, Center for American Political Studies, 2003-2009
Organizer, Political Psychology and Behavior Workshop, 2003-2008
Standing Committee on Women, Harvard FAS 2004-2005

EXHIBIT C

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ALABAMA SOUTHERN DIVISION

STATE OF ALABAMA, and MORRIS J. BROOKS, JR., Representative for Alabama's 5th Congressional District,

*Plaintiff*s,

v.

UNITED STATES DEPARTMENT OF COMMERCE, et al.

Defendants,

And

DIANA MARTINEZ, et al.,

Defendant-Intervenors,

COUNTY OF SANTA CLARA, CALIFORNIA, et al,

Defendant-Intervenors,

And

STATE OF NEW YORK, et al.,

Defendant-Intervenors.

Civil Action No. 2:18-cv-00772-RDP

SWORN DECLARATION AND SECOND SUPPLEMENTAL EXPERT REPORT OF DUDLEY L. POSTON, JR., Ph.D.

My name is Dudley L. Poston, Jr. I have previously submitted an expert report ("Poston Report"), a supplemental expert report ("Poston Supplemental Report"),

and a rebuttal report in this case. In my initial report, I estimated the 2020 apportionment calculations based on population estimates for 2018 of the resident populations of the 50 states that were prepared by the U.S. Census Bureau. In late 2019, the U.S. Census Bureau produced estimates of the population counts of the resident populations of the states for July 2019. With these 2019 data, I updated my apportionment data and results and presented them in my Supplemental Report.

Since that date, the U.S. Census Bureau has released more recent estimates of the population counts of the resident populations of the states for July 2020. With these new data, I have now developed estimates of the resident populations of the 50 states for April 1, 2020 and then used those estimates to apportion the House seats as set out in detail below.

Also I have used estimates of the numbers of undocumented persons residing in the 50 states developed by the demographer Robert Warren of the Center for Migration Studies and published in the *Journal on Migration and Human Security*. I have used these estimates to examine the effect excluding undocumented persons from the apportionment population would have on the apportionment of Congressional seats among the states.

I.
Development of estimates of the resident populations of the 50 states for April 1, 2020, and use of these numbers to apportion the House.

I began with the estimated resident population counts of the states for July 1, 2020 produced by the U.S. Census Bureau (col. E of Table). I subtracted from these 2020 counts the final Census Bureau estimated counts for July 1, 2019 of the resident populations (col. D of Table). I then took three-fourths of the differences, and added them to the July 1, 2019 population estimates, to yield April 1, 2020 estimated counts of the resident populations of the states (col. F of Table).

My assumptions are: (1) that the Census Bureau's estimates of the states' July 1, 2019 and July 1, 2020 populations are their true counts in 2019 and 2020, and (2) that the states will grow or decline in size between July 1, 2019 and April 1, 2020 at the same rates as the estimated changes between July 1, 2019 and July 1, 2020.

The estimated counts of the April 1, 2020 resident populations are shown in col. F of the Table.

Using these estimated counts of the resident populations of April 1, 2020, I then apportioned the House. Seat assignments are shown in col. G of the Table.

Alabama ends up with 6 seats, and ends up ranked in 436th place to receive its 7th seat.

Notes about the Overseas Population

In the apportionments calculated by the U.S. Census Bureau for earlier periods, e.g., 2010 and 2000 and some other decennial years, the apportionment populations of the states were defined as the resident populations plus certain individuals living overseas who claim the state as their "state of residence," namely, military personnel and U.S. government employees of the U.S. and their dependents.

Data on the overseas population are only available for 2010. We do not have data for this population for 2020. The best 2020 estimates of the overseas counts we could produce resulted from multiplying the 2010 proportion of overseas to the resident population by the 2020 resident populations.

I opted against including the overseas populations in the calculations of the apportionment populations for the following reasons:

1. As just noted, we do not have overseas data for 2020 and for other years following 2010; the data are available only for 2010.

2. There has been a major reduction since 2010 in the numbers of U.S. military troops stationed overseas. Research published in 2017 by the Pew Research Center indicates that the number of active-duty U.S. military troops stationed overseas had declined by 2016 to its lowest numbers in 60 years (Bialik, 2017). Also, the Department of Defense's Defense Manpower Data Center has published data of overseas DOD personnel showing steep drops between September 2010 with a count

of 449,952 persons total (cell W230 in the September 2010 spreadsheet) and March 2020 with a count of 229,843 persons (cell W241 in March 2020 spreadsheet). (The spreadsheets are available at: https://www.dmdc.osd.mil/appj/dwp/dwp_reports.jsp.)

3. In the 2020 calculations of the overseas population, there will be a change in its definition. In 2010, overseas military personnel were counted in the states they identified at their time of enrollment as their state "home of record." In 2020, deployed military personnel will be counted at their usual residences. Military personnel who are stationed overseas will still be counted in their home of record state, like in 2010. Deployed personnel are stationed in the U.S. but sent abroad, whereas stationed personnel are those stationed abroad.

4. When many private organizations, e.g., Brookings, calculate expected seat assignments for the 2020 apportionment, they base their state population counts only on the resident populations; they do not include overseas population numbers (Frey, 2020).

In light of the above four issues, I decided in the various apportionments I prepared for 2020 and present in this Report to exclude from my calculations any estimates of the 2020 overseas populations.

II.
Apportionment of the House under four different scenarios withdrawing from the estimated resident populations (col. F of Table) the numbers of undocumented residents.

Recent estimates of the numbers of undocumented persons residing in the 50 states were developed by the demographer Robert Warren of the Center for Migration Studies, that were published in the *Journal on Migration and Human Security*, February 26, 2020 (https://journals.sagepub.com/doi/pdf/10.1177/2331502420906125). See his data in col. L of the Table. These are the most recent estimates of the number of undocumented immigrants residing in the U.S., a total of 10.5 million.

I divided Warren's 2018 undocumented estimates by the Census Bureau's estimates of the 2018 resident populations of the states, to obtain estimates of the proportions of undocumented immigrants in the states in 2018 (col. I of Table). I then multiplied the 2018 proportions of undocumented immigrants in each state by our estimates of the states' 2020 resident populations and subtracted the resulting numbers from their 2020 resident populations (see col. J of the Table).

This assumes that the proportions of undocumented immigrants in the states in 2018, based on the data provided by Warren, will be the same proportions in 2020.

II. 1. Using these estimated counts of the resident populations of April 1, 2020 minus all undocs (col. J of the Table), I then apportioned the House. Seat assignments are shown in col. K of the Table.

Alabama ends up with 7 seats. Alabama receives its 7th seat in this apportionment ranked in 429th place.

II.2. I next subtracted 50% of the undocumented residents from the estimates of the 2020 resident populations; these counts are shown in col. L of the table. I apportioned the House with the data in col. L. Seat assignments are shown in col. M of the table.

Alabama ends up with 7 seats. Alabama receives its 7th seat in this apportionment ranked in 433rd place.

II.3. I next subtracted 25% of the undocumented residents from the estimates of the 2020 resident populations; these counts are shown in col. N of the table. I apportioned the House with the data in col. N. Seat assignments are shown in col. O of the table.

Alabama ends up with 7 seats. Alabama receives its 7th seat in this apportionment ranked in 434th place.

II.4. I next subtracted 10% of the undocumented residents from the estimates of the 2020 resident populations; these counts are shown in col. P of the table. I apportioned the House with the data in col. P. Seat assignments are shown in col. Q of the table.

Alabama ends up with 7 seats. Alabama receives its 7th seat in this apportionment ranked in 435th place.

Conclusion

In this report I have summarized apportionment work conducted during the 1-29-2021 to 2-3-2021 period. Five apportionments were produced for 2020. Each one is identified below, followed by the number of seats received by Alabama, and the seat ranking in each of the apportionments for Alabama to receive its 7th seat.

Apportionment Scenario	# seats to Alabama	Ranking for 7th seat
2020 Resident Population	6	436
2020 Resident Pop minus 100% of Undocs	7	429
2020 Resident Pop minus 50% of Undocs	7	433
2020 Resident Pop minus 25% of Undocs	7	434
2020 Resident Pop minus 10% of Undocs	7	435

These results are consistent with my original reports and the conclusions I drew in those reports.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the above information is true and correct to the best of my knowledge and belief.

Executed on February 4, 2021.

DUDLEY L. POSTON, JR., Ph.D.

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Bialik, Kristen. 2017. "U.S. Active-Duty Military Presence Overseas Is At Its Smallest In Decades." Pew Research Center, August 22: https://www.pewresearch.org/fact-tank/2017/08/22/u-s-active-duty-military-presenceoverseas-is-at-its-smallest-in-decades/

Department of Defense, Defense Manpower Data Center, "DoD Personnel, Workforce Reports & Publications: Military and Civilian Personnel by Service/Agency by State/Country, March 2020." Washington, DC: DMDC: https://www.dmdc.osd.mil/appj/dwp/rest/download?fileName=DMDC_Website_Location_Report_2003.xlsx&groupName=milRegionCountry

Department of Defense, Defense Manpower Data Center, "DoD Personnel, Workforce Reports & Publications: Military and Civilian Personnel by Service/Agency by State/Country, September 2010." Washington, DC: DMDC: https://www.dmdc.osd.mil/appj/dwp/rest/download?fileName=DMDC_Website_Location_Report_1009.xlsx&groupName=milRegionCountry

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Col. A	Col. B	Col. C	Col. D	Col. E	Col. F	Col. G	Col. H	Col. I	Col. J	Col. K	Col. L	Col. M	Col. N	Col. O	Col. P	Col. Q
STATE	Census count 4/1/2010 resident pop	CB estimate 7/1/2019 prelim resident pop	CB estimate 7/1/2019 final resident pop	CB estimate 7/1/2020 resident pop	My estimate Apr 1-2020 resident pop	col-f-calcs number of seats	Warren 2018 undoc estimates	undoc proportion of 2018 resid pop	2020 resid population minus all undocs	col-j-calcs number of seats	2020 resid population minus 50% undocs	col-l-calcs number of seats	2020 resid population minus 25% undocs	col-n-calcs number of seats	2020 resid population minus 10% undocs	col-p-calcs number of seats
Alabama	4,779,736	4,903,185	4,907,965	4,921,532	4,918,140	6	56,000	0.011457	4,861,793	7	4,889,967	7	4,904,053	7	4,912,506	7
Alaska	710,231	731,545	733,603	731,158	731,769	1	6,000	0.008136	725,816	1	728,792	1	730,281	1	731,174	1
Arizona	6,392,017	7,278,717	7,291,843	7,421,401	7,389,012	10	260,000	0.036254	7,121,130	10	7,255,071	10	7,322,041	10	7,362,223	10
Arkansas	2,915,918	3,017,804	3,020,985	3,030,522	3,028,138	4	61,000	0.02024	2,966,848	4	2,997,493	4	3,012,815	4	3,022,009	4
California	37,253,956	39,512,223	39,437,610	39,368,078	39,385,461	52	2,312,000	0.058447	37,083,499	51	38,234,480	51	38,809,970	52	39,155,265	52
Colorado	5,029,196	5,758,736	5,758,486	5,807,719	5,795,411	8	159,000	0.027916	5,633,626	8	5,714,518	8	5,754,965	8	5,779,232	8
Connecticut	3,574,097	3,565,287	3,566,022	3,557,006	3,559,260	5	116,000	0.032469	3,443,694	5	3,501,477	5	3,530,369	5	3,547,703	5
Delaware	897,934	973,764	976,668	986,809	984,274	1	25,000	0.025849	958,831	1	971,553	1	977,913	1	981,730	1
Florida	18,801,310	21,477,737	21,492,056	21,733,312	21,672,998	29	756,000	0.035494	20,903,737	29	21,288,367	29	21,480,683	29	21,596,072	29
Georgia	9,687,653	10,617,423	10,628,020	10,710,017	10,689,518	14	343,000	0.032606	10,340,975	14	10,515,247	14	10,602,382	14	10,654,664	14
Hawaii	1,360,301	1,415,872	1,415,615	1,407,006	1,409,158	2	35,000	0.024639	1,374,438	2	1,391,798	2	1,400,478	2	1,405,686	2
Idaho	1,567,582	1,787,065	1,789,060	1,826,913	1,817,450	2	37,000	0.021092	1,779,116	2	1,798,283	2	1,807,866	2	1,813,616	2
Illinois	12,830,632	12,671,821	12,667,017	12,587,530	12,607,402	17	449,000	0.03524	12,163,117	17	12,385,259	17	12,496,331	17	12,562,973	17
Indiana	6,483,802	6,732,219	6,731,010	6,754,953	6,748,967	9	104,000	0.015541	6,644,082	9	6,696,524	9	6,722,746	9	6,738,479	9
Iowa	3,046,355	3,155,070	3,159,596	3,163,561	3,162,570	4	52,000	0.016476	3,110,463	4	3,136,517	4	3,149,543	4	3,157,359	4
Kansas	2,853,118	2,913,314	2,912,635	2,913,805	2,913,513	4	77,000	0.026447	2,836,459	4	2,874,986	4	2,894,249	4	2,905,807	4
Kentucky	4,339,367	4,467,673	4,472,345	4,477,251	4,476,025	6	49,000	0.010966	4,426,940	6	4,451,482	6	4,463,753	6	4,471,116	6
Louisiana	4,533,372	4,648,794	4,658,285	4,645,318	4,648,560	6	66,000	0.014163	4,582,722	6	4,615,641	6	4,632,100	6	4,641,976	6
Maine	1,328,361	1,344,212	1,345,770	1,350,141	1,349,048	2	4,000	0.002989	1,345,016	2	1,347,032	2	1,348,040	2	1,348,645	2
Maryland	5,773,552	6,045,680	6,054,954	6,055,802	6,055,590	8	214,000	0.035415	5,841,131	8	5,948,361	8	6,001,975	8	6,034,144	8
Massachusetts	6,547,629	6,892,503	6,894,883	6,893,574	6,893,901	9	182,000	0.026369	6,712,116	9	6,803,009	9	6,848,455	9	6,875,723	9
Michigan	9,883,640	9,986,857	9,984,795	9,966,555	9,971,115	13	113,000	0.011305	9,858,392	13	9,914,753	13	9,942,934	13	9,959,843	13
Minnesota	5,303,925	5,639,632	5,640,053	5,657,342	5,653,020	7	87,000	0.015505	5,565,370	8	5,609,195	8	5,631,107	7	5,644,255	7
Mississippi	2,967,297	2,976,149	2,978,227	2,966,786	2,969,646	4	24,000	0.008036	2,945,782	4	2,957,714	4	2,963,680	4	2,967,260	4
Missouri	5,988,927	6,137,428	6,140,475	6,151,548	6,148,780	8	50,000	0.008161	6,098,600	8	6,123,690	8	6,136,235	8	6,143,762	8
Montana	989,415	1,068,778	1,070,123	1,080,577	1,077,964	2	2,000	0.001883	1,075,934	2	1,076,949	2	1,077,456	2	1,077,761	2
Nebraska	1,826,341	1,934,408	1,932,571	1,937,552	1,936,307	3	45,000	0.023325	1,891,142	3	1,913,725	3	1,925,016	3	1,931,790	3
Nevada	2,700,551	3,080,156	3,090,771	3,138,259	3,126,387	4	160,000	0.052729	2,961,536	4	3,043,961	4	3,085,174	4	3,109,902	4
New Hampshire	1,316,470	1,359,711	1,360,783	1,366,275	1,364,902	2	6,000	0.004423	1,358,865	2	1,361,884	2	1,363,393	2	1,364,298	2
New Jersey	8,791,894	8,882,190	8,891,258	8,882,371	8,884,593	12	417,000	0.046809	8,468,714	12	8,676,653	12	8,780,623	12	8,843,005	12
New Mexico	2,059,179	2,096,829	2,099,634	2,106,319	2,104,648	3	64,000	0.030543	2,040,365	3	2,072,507	3	2,088,577	3	2,098,220	3
New York	19,378,102	19,453,561	19,463,131	19,336,776	19,368,365	26	684,000	0.035001	18,690,453	26	19,029,409	25	19,198,887	25	19,300,574	26
North Carolina	9,535,483	10,488,084	10,501,384	10,600,823	10,575,963	14	301,000	0.028988	10,269,387	14	10,422,675	14	10,499,319	14	10,545,306	14
North Dakota	672,591	762,062	763,724	765,309	764,913	1	7,000	0.00921	757,868	1	761,390	1	763,152	1	764,208	1
Ohio	11,536,504	11,689,100	11,696,507	11,693,217	11,694,040	15	95,000	0.008127	11,599,002	16	11,646,521	16	11,670,280	16	11,684,536	15
Oklahoma	3,751,351	3,956,971	3,960,676	3,980,783	3,975,756	5	84,000	0.021303	3,891,061	5	3,933,408	5	3,954,582	5	3,967,287	5
Oregon	3,831,074	4,217,737	4,216,116	4,241,507	4,235,159	6	119,000	0.028396	4,114,898	6	4,175,028	6	4,205,094	6	4,223,133	6
Pennsylvania	12,702,379	12,801,989	12,798,883	12,783,254	12,787,161	17	187,000	0.014601	12,600,456	17	12,693,809	17	12,740,485	17	12,768,491	17
Rhode Island	1,052,567	1,059,361	1,058,158	1,057,125	1,057,383	1	24,000	0.022699	1,033,382	1	1,045,382	1	1,051,383	1	1,054,983	1
South Carolina	4,625,364	5,148,714	5,157,702	5,218,040	5,202,956	7	75,000	0.014752	5,126,202	7	5,164,579	7	5,183,767	7	5,195,280	7
South Dakota	814,180	884,659	887,127	892,717	891,320	1	5,000	0.005667	886,268	1	888,794	1	890,057	1	890,814	1
Tennessee	6,346,105	6,829,174	6,830,325	6,886,834	6,872,707	9	126,000	0.018611	6,744,799	9	6,808,753	9	6,840,730	9	6,859,916	9
Texas	25,145,561	28,995,881	28,986,794	29,360,759	29,267,268	39	1,795,000	0.06254	27,436,893	37	28,352,080	38	28,809,674	38	29,084,230	38
Utah	2,763,885	3,205,958	3,203,383	3,249,879	3,238,255	4	92,000	0.029104	3,144,009	4	3,191,132	4	3,214,693	4	3,228,830	4
Vermont	625,741	623,989	624,046	623,347	623,522	1	4,000	0.006387	619,539	1	621,531	1	622,526	1	623,124	1
Virginia	8,001,024	8,535,519	8,556,642	8,590,563	8,582,083	11	266,000	0.031229	8,314,073	11	8,448,078	11	8,515,080	11	8,555,282	11

Washington	6,724,540	7,614,893	7,614,024	7,693,612	7,673,715	10	271,000	0.035963	7,397,745	10	7,535,730	10	7,604,723	10	7,646,118	10
West Virginia	1,852,994	1,792,147	1,795,263	1,784,787	1,787,406	2	3,000	0.001661	1,784,437	2	1,785,922	2	1,786,664	2	1,787,109	2
Wisconsin	5,686,986	5,822,434	5,824,581	5,832,655	5,830,637	8	73,000	0.012557	5,757,421	8	5,794,029	8	5,812,333	8	5,823,315	8
Wyoming	563,626	578,759	580,116	582,328	581,775	1	4,000	0.006924	577,747	1	579,761	1	580,768	1	581,372	1
TOTAL	308,143,815	327,533,774	327,621,700	328,771,307	328,483,905	435	10,546,000		317,865,888	435	323,174,897	435	325,829,401	435	327,422,104	435

EXHIBIT D

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ALABAMA SOUTHERN DIVISION

STATE OF ALABAMA, and MORRIS J. BROOKS, JR., Representative for Alabama's 5th Congressional District, *Plaintiffs*, v. UNITED STATES DEPARTMENT OF COMMERCE, et al. *Defendants*, And DIANA MARTINEZ, et al., *Defendant-Intervenors*, COUNTY OF SANTA CLARA, CALIFORNIA, et al, *Defendant-Intervenors*, And STATE OF NEW YORK, et al., *Defendant-Intervenors.*	Civil Action No. 2:18-cv-00772-RDP

SWORN DECLARATION AND EXPERT REPORT OF DUDLEY L. POSTON, JR., Ph.D.

My name is Dudley L. Poston, Jr. I am an Emeritus Professor of Sociology at Texas A&M University. I retired from the sociology faculty at Texas A&M University at the beginning of June of 2019 after almost 50 years on the sociology and rural sociology faculties at three universities (University of Texas at Austin, 1970 to 1988; Cornell University, 1988 to 1992; and Texas A&M University, 1992

to 2019). Prior to my retirement as a sociology professor at Texas A&M, I also held the position at Texas A&M University of the George T. and Gladys H. Abell Endowed Professor of Liberal Arts. I also held the positions of Adjunct Professor of Demography at People's University, Beijing, China; Adjunct Professor of Sociology at Fuzhou University, Fuzhou, China; and Adjunct Professor of Demography at Nanjing Normal University, Nanjing, China. My Curriculum Vitae and a list of all publications I have authored or co-authored in the last 10 years are attached as Appendices to this report. I have not testified as an expert within the last four (4) years. I am being compensated at the rates of $200 per hour for case-related travel; $300 per hour for research and writing; and $400 per hour for deposition and trial testimony.

I have been retained by the State of Alabama in this case to assess the likely effects of including or excluding illegal aliens (also known as "undocumented persons") in the apportionment base of each state following the 2020 United States Census. More specifically, I have been retained to assess whether it is substantially likely that Alabama will lose a representative in the United States House of Representatives if undocumented persons are included in the apportionment base for each state, and whether Alabama is likely to retain that representative if undocumented persons are excluded from the apportionment base. I have also been asked to opine on how including or excluding undocumented persons would affect

the size of the average congressional districts in the states in terms of lawful inhabitants.

OPINIONS

Following my research and utilizing my experience with demographic and quantitative methods, my opinions are as follows:

Opinion Number One: If undocumented persons are included in the 2020 United States Census apportionment population, the State of Alabama is substantially likely to be allotted only six seats in the United States House of Representatives.

Opinion Number Two: Conversely, if undocumented persons are excluded from the 2020 United States Census apportionment population, the State of Alabama is substantially likely to be allotted seven seats in the United States House of Representatives.

Opinion Number Three: Including undocumented persons in the 2020 United States Census apportionment population is likely to cause greater disparities in the number of lawful inhabitants per Congressional district than if undocumented persons are excluded from the apportionment population.

For example, including undocumented persons in the 2020 Census apportionment population, Texas would have, on average, 762,431 lawful inhabitants per district, while Alabama would have 823,115, for a difference of

around 61,000 persons. Excluding undocumented persons from the apportionment population will reduce this disparity by changing Texas's and Alabama's average district sizes to, respectively, 738,108 and 697,102, for a difference of around 41,000.

I am not an attorney and my references to constitutional and statutory provisions and court cases are for purposes of providing historical context. I express no opinion as to whether the *Constitution* does or does not require that the Census include or exclude undocumented persons in the apportionment population.

OVERVIEW

In this report, I first discuss the concept of Congressional apportionment and the Equal Proportions method that is used for apportioning the seats of the U.S. House among the 50 states. I focus in particular on the 2010 apportionment. Next, I discuss the methods I used to develop apportionment data for the states for 2020. Using these data, I then apportion the House for 2020 (summarized in columns 4 and 5 in Table 2). I next create a model in which the apportionment population is defined so as to exclude undocumented persons.[1] I show how this alternate apportionment population for each state is defined. I then use these redefined apportionment data to

[1] When I use the term "undocumented persons," I am referring to two types of persons, namely, (1) persons who entered the U.S. in an unauthorized fashion; and (2) persons who entered the country legally and overstayed their visas or violated the conditions of their visas.

apportion the House for 2020 (see columns 7 and 8 in Table 2). Next, I take the two sets of seat assignments for 2020 and for each state determine the number of persons in their 2020 populations per seat per state with undocumented persons in the apportionment populations (see column 6 in Table 2) and with undocumented persons excluded from the apportionment populations (see column 9 in Table 2). Throughout this report I focus in particular on the apportionment results and calculations for the state of Alabama.

The Congressional Apportionment Method And the Method of Equal Proportions

The primary purpose of the decennial census is to provide population counts for the states that are then used in the apportioning of the House of Representatives. And the major objective in apportioning the U.S. House of Representatives is to assign equitably the 435 seats to the 50 states; the District of Columbia is not included in the apportionment and thus does not receive representation in the House. There are several constraints: (1) the total number of House seats must equal 435; (2) partial seats cannot be assigned to states, nor can representatives be given fractional votes; (3) representatives may not be shared by two or more states; and (4) every state must be assigned at least one seat in the House (Baumle and Poston, 2004, 2019).

The first 50 seats are automatically assigned, one per state. The Method of Equal Proportions is then used to assign the remaining 385 seats. This method

identifies which states should receive second seats, which states should receive third seats, and so forth. Although, as I noted above, the *Constitution* does not dictate how the apportionment should be carried out, the underlying assumption is "one man, one vote." That is, no one person should have more of a voice than another person. Representatives should thus be assigned to states in proportion to their populations. But as Balinski and Young (1982: 1) have argued, the notion of proportionality is not enough by itself to "solve the problem of apportionment" because it does not address what is to be done with fractions (also see Anderson [2015]).

Here is a highly unlikely example that I have adapted from Schmeckebier (1941: 2) that uses different numbers but that makes the above issue quite clear. If the population of the 50 states (excluding the District of Columbia) were exactly 304.5 million, every 700,000 persons would receive exactly one Congressional representative (or 700,000 x's 435 representatives = 304.5 million). If the size of every state was an exact multiple of 700,000, then it would be easy to assign members to the House; each state would receive one representative for each multiple of 700,000 in its population. The difficulty is that the mathematics of the counts are never so precise that the ratio of population to representatives is exact. There will almost always be a remainder.

As I have already noted the first 50 seats are automatically assigned, one per state. Every one of the 50 states gets one seat irrespective of the size of its population.

Also as noted above, the District of Columbia is not included in the apportionment and thus does not receive voting representation in the House. The apportionment method of Equal Proportions then divides up the remaining 385 seats. The method determines which states should receive second seats, which states should receive third seats, and so forth. The method of Equal Proportions was first used to apportion the House in 1940 and has been used ever since. It is a divisor method that first develops a target ratio of population to representatives that is based on data for the nation. In 2010, the apportionment population (the population counted by the Census Bureau residing in each state plus certain individuals living overseas who claim the state as their "state of residence," namely, military personnel and U.S. government employees and their dependents) of the United States was 309,183,463. Hence, the target ratio in 2010 was 710,766.6 (or 309,183,463 divided by 435). This ratio, also called a divisor, is then divided into the apportionment populations of each of the states to obtain quotients. The method of Equal Proportions endeavors to ensure that "the difference between the representation of any two states is the smallest possible when measured both by the relative difference in the average population per district, and also by the relative difference in the individual share in a representative" (Schmeckebier, 1941: 22; Poston and Bouvier, 2017). The method gives to a state another representative "when its [apportionment] population, divided by the geometric mean of its present assignment of representatives and of its next higher

assignment, is greater than the [apportionment] population of any other state divided by the geometric mean of the assignment to such other state and its next higher assignment" (Schmeckebier, 1941: 22).

The first step in using the method of Equal Proportions is to multiply the apportionment population of each state by the following fraction:

$$\frac{1}{\sqrt{N(N-1)}}$$

where N equals the particular seat being claimed, that is, the second seat or the third seat or the fourth seat, and so on. This provides numbers known as priority values. For instance, the proportion used in determining a state's claim to a second seat is:

$$\frac{1}{\sqrt{2(2-1)}} = \frac{1}{\sqrt{2}} = \frac{1}{1.41421356} = 0.70710678$$

The proportion used in determining a state's claim to a third seat is:

$$\frac{1}{\sqrt{3(3-1)}} = \frac{1}{\sqrt{6}} = \frac{1}{2.44948974} = 0.40824829$$

The rounding rule for this method is to round a state's quotient either up or down, "depending on whether or not the quotient exceeds the 'geometric mean' of these two choices" (Balinski and Young, 1982: 62). The geometric mean of two numbers is the square root of their product. Thus, according to the method of Equal Proportions, if a state had a quotient of 1.39, it would receive one representative

because the geometric mean of 1 and 2 is 1.41; however, if a state had a quotient of 1.42, it would receive two representatives.

In the actual apportionment calculations, the above procedure and rule are not invoked. Instead, one relies entirely on the proportions developed for the various seats. Thus, once the multipliers, i.e., the proportions, are developed for determining the priorities for as many as 59 seats (I showed above the calculations of the proportions for seats 2 and 3), all of these 59 proportions are then multiplied by the apportionment populations of each of the 50 states. That is, the proportion used for determining the states' priorities for a second seat (0.70710678) is successively multiplied by the apportionment populations of each of the 50 states; this procedure is then repeated using the proportion to determine the states' priorities for a third seat (0.40824829) and so forth. After all of these multiplications have been completed (and this results in 2,950 calculations, i.e., 59 seat multipliers times the apportionment populations of each of the 50 states, or 59 x's 50 = 2,950), the resulting 2,950 priority values are then ranked in order, the largest first and the smallest last. The 385 House seats are then assigned to the states with the 385 highest priority values (Poston and Bouvier, 2017).

In Table 1, I report the application of the Method of Equal Proportions in 2010 and identify the states receiving the first six seats and those receiving the last six

seats. I also show the states that would have received the three seats beyond the 435th seat if more than 435 seats were available.

In the 2010 apportionment, California received the 51st seat. Its priority value for a 2nd seat, 26,404,774 was obtained by multiplying its 2010 apportionment population of 37,341,989 by the "second seat" proportion of 0.70710678. Texas received the 52nd seat with its priority value for a 2nd seat of 17,867,470, which was determined by multiplying its 2010 apportionment population of 25,268,418 by 0.70710678. The 51st and 52nd seats were thus assigned to the two largest states, California and Texas. New York had the third largest population of all the states in 2010, but New York did not receive the 53rd seat because its priority value for a 2nd seat of 13,732,760 was smaller than California's priority value for a 3rd seat of 15,244,803 (the priority value for California's 3rd seat is obtained by multiplying California's apportionment population of 37,341,989 by the "third seat" proportion of 0.40824829). So California received the 53rd seat and New York the 54th seat. Florida received the 55th seat as its 2nd seat, California received the 56th seat as its 4th seat, and Texas received the 57th seat as its 3rd seat.

Alabama received seven seats in the 2010 apportionment. Its 1st seat was the automatically assigned seat (recall that every state receives one seat irrespective of the size of its population). Second and higher seats are assigned to states on the basis of the size of their apportionment populations. In the 2010 apportionment, several

states, namely, Alaska, Delaware, Montana, North Dakota, South Dakota, Vermont, and Wyoming only received the automatic 1st seat and no other seats. The 2nd seat priority values for these states were all less than the 8th seat priority value for Minnesota, the state that received the 435th and last seat; see Table 1.

Alabama's 2nd seat priority value was 3,396,221; this priority value for a 2nd seat was obtained by multiplying Alabama's 2010 apportionment population of 4,802,982 by the "second seat" multiplier of 0.70710678. Alabama's 2nd seat was the 104th House seat. Alabama's 3rd seat priority value was 1,960,809; this priority value for a 3rd seat was obtained by multiplying Alabama's 2010 apportionment population of 4,802,982 by the "third seat" multiplier of 0.40824829. Alabama's 3rd seat was the 166th House seat.

Alabama's 4th, 5th, 6th and 7th seats were the 227th, 294th, 354th, and 421st seats in the U.S. House. Finally, Alabama's 8th seat priority value was 641,831; this priority value for an eighth seat was obtained by multiplying Alabama's 2010 apportionment population of 4,802,982 by the "eighth seat" multiplier of 0.1336317. However, the 8th seat priority value for Alabama was less than the 8th seat priority value for Minnesota, the state that received the 435th and last seat in the U.S. House. Hence, Alabama did not receive an 8th seat in 2010.

Table 1 also shows the states receiving the last six seats in the House, the 430th through the 435th seats. Note, for instance, that Texas's priority value for a

36th seat was slightly larger than California's claim for a 53rd seat, so, therefore, the 433rd seat was assigned to Texas and the 434th to California. Minnesota received the 435th and last House seat; it was allocated as Minnesota's 8th seat. The states of North Carolina, Missouri, and New York were next in line to receive the 436th, 437th, and 438th seats had the House allocated three more seats. For a fuller discussion of apportionment, its history and calculations see Burnett (2011) and Poston and Bouvier (2017) for the 2010 apportionment, and see Baumle and Poston (2004) for the 2000 apportionment.

The Apportionment Population

In the apportionments of 2010, 2000, 1990, and 1970, the apportionment population of a state was defined as its resident population plus all American military and civilian personnel of the federal government, and their dependents, from the state who were residing abroad. This extension of the definition resulted from the increasingly large numbers of U.S. citizens living overseas in those years. In 1950, 1960, and 1980, the overseas populations were not incorporated into the apportionment populations because their numbers were deemed to be too few for inclusion.

The inclusion of only a subset of U.S. citizens living overseas in the apportionment population has produced some legal challenges. In 1992, Massachusetts argued that the inclusion of the federal overseas population was in

conflict with the constitutional requirement that the actual number of persons in each state be counted because the overseas population is not actually residing in the states (*Franklin v. Massachusetts* 1992). The Supreme Court, however, focused on the ties that the federal overseas population typically maintain with their home state and determined that their inclusion was constitutional (although not mandated) (*Franklin v. Massachusetts* 1992). In 2001, another challenge to the inclusion of this population was made by Utah, which argued that either Mormon missionaries residing overseas should be included in the apportionment population or that no citizens overseas should be included (*Utah v Evans* 2001). The district court ruled against Utah in this matter and the Supreme Court declined to hear the case on appeal. Thus, the current practice remains to include only federal overseas employees in the apportionment population.

The Development of Apportionment Data for 2020

I first needed to develop apportionment population data for 2020 for each of the 50 states. I now discuss how I developed the 2020 apportionment data.

In Table 2, I present the names of the states in Column 1, followed in Column 2 by their 2010 apportionment population counts. Then in Column 3, I show the number of House seats each of the states was assigned in 2010.

In Column 4, I present what I have projected to be the 2020 apportionment populations of each of the 50 states. In these 2020 projections I use the current

definition of the apportionment population, namely, the resident population of the state in 2020 plus the "overseas population" from that state, that is, those U.S. government employees and members of the military, and their dependents, serving overseas, who claim the state as their "state of record."

Here is how I developed the projections for 2020 shown in Column 4 for the resident populations of the 50 states. I first took the estimated resident populations of the states for 2018 as produced by the U.S. Census Bureau and subtracted from these 2018 estimates the 2010 census counts of their resident populations. I then annualized these 2010–2018 differences, multiplied them by two, and then added them to the 2018 population estimates, to yield 2020 projected counts of the resident populations of the states. My assumptions are (1) that the Census Bureau's estimates of the states' 2018 populations are their true counts in 2018, and (2) that the states will grow or decline in size between 2018 and 2020 at the same annual rates as their changes between 2010 and 2018.

Next, to determine the projected counts of the 2020 overseas populations of the states, I calculated the proportion of each state's 2010 resident population to the number of overseas persons in 2010. I then multiplied these 2010 overseas proportions by the 2020 resident populations of the states; I then added these estimates of the 2020 overseas population counts to the 2020 resident populations to produce the projections of the 2020 apportionment populations. My assumption here

is that the proportions of the overseas populations to the resident populations of the 50 states in 2020 will be the same as the proportions were in 2010. These are the projected apportionment population counts reported for the states in Column 4 of Table 2.

I next used these apportionment population counts in Column 4 to apportion the House for 2020, using the Method of Equal Proportions, thus providing for each of the 50 states its expected number of seats in the House in 2020. The numbers of House seats for the 50 states are presented in Column 5. Note that when I use the Method of Equal Proportions to apportion the House with my projected counts of the 2020 apportionment populations shown in Column 4 of Table 2, Alabama ends up receiving six seats in 2020, a loss of one seat from the seven seats received by Alabama in 2010. My home state of Texas ends up receiving 39 seats in 2020, which is a gain of three seats from the 36 seats that Texas received in 2010.

I next developed population projections for 2020 for the populations of the 50 states excluding the undocumented persons estimated to be residing in the states in 2020. These projections are presented in Column 7 of Table 2. Here is how I developed these projections.

In my model that excludes undocumented immigrants from the apportionment populations, states with large undocumented immigrant populations will tend to lose seats. I first estimated the number of undocumented immigrants residing in the states

in 2020. I obtained data from the Pew Research Center on the estimated numbers of undocumented immigrants residing in the 50 states in 2016 (Pew Research Center, 2019).[2] I then multiplied the proportions of undocumented immigrants in each state in 2016 by the states' projected 2020 resident populations and subtracted the resulting numbers from their 2020 resident populations. I then added in my estimates of the state's overseas population, as discussed above. I am assuming that the proportions of undocumented immigrants in the states in 2016 will be the same proportions in 2020. These projected counts of the apportionment populations of the states excluding the undocumented persons in the states are presented in Column 7 of Table 2.

I next used the Method of Equal Proportions to apportion the House using these adjusted 2020 state apportionment population numbers that do not include undocumented immigrants. The numbers of seats assigned to the states are shown in Column 8 of Table 2. Alabama ends up receiving seven seats in 2020, if the apportionment populations exclude undocumented persons, which is a gain of one seat over the six it would receive if undocumented persons were counted in the populations. In contrast, my home state of Texas ends up receiving 38 seats in 2020

[2] While there are inherent difficulties in counting undocumented immigrants (Passel and Cohn, 2016; Lopez, Passel and Rohal, 2015), the Pew Research Center's numbers are generally accepted as the best estimates of the count.

if undocumented persons are excluded from the 2020 counts, a loss of one seat from the 39 seats Texas is expected to receive if undocumented persons are included in the 2020 counts.

Finally, I was interested in ascertaining for 2020 what the numbers of persons per House seat in the states would be with and without undocumented persons in the apportionment populations. For each state I thus divided the 2020 apportionment population by the number of House seats assigned to the state. I did this twice, once using the data with undocumented persons in the counts, and next using the data with undocumented persons not in the counts. These population per seat calculations are shown in Column 6 and Column 9.

For most of the states their population per seat calculations are larger when undocumented persons are included in the apportionment populations than when they are not included. The differences are large for some states and small for other states.

I will consider Alabama as an example. When undocumented persons are included in the 2020 counts, Alabama ends up with 823,115 persons per seat. When undocumented persons are excluded from the calculations, Alabama ends up with 697,102 persons per seat.

There are at least two ways to evaluate these population per seat data. One way is to ask if the variance among the states becomes smaller when undocumented

persons are excluded. Ideally one would prefer that the degree of dispersion across the states in the population per seat calculations would be as small as possible. The smaller the variance the more similar the states' values to the mean value across the 50 states. I have thus calculated the standard deviation for the data measuring the population per house seat among the states shown in Column 6 of Table 2. The standard deviation of 84,557 is shown at the bottom of Column 6. This figure tells us how dispersed the counts among the states of population per seat are.

Next, I calculated the standard deviation of the same data but where undocumented persons have been removed from the apportionment populations. The standard deviation of this distribution is 81,901 and is shown at the bottom of Column 9.

These two standard deviations inform us that the population per seat counts among the states are less dispersed, that is, there is less variance in the data, when undocumented persons are excluded from the apportionment populations than when they are included.

Another way to evaluate the population per seat counts would be to compare the counts for Alabama with another state. I will compare Alabama with Texas.

When undocumented persons are included in the 2020 apportionment populations of the states, Alabama ends up with a population per seat value of 823,115, meaning that in Alabama in 2020 there will be over 823,000 persons for

every one of its six House seats. Texas has a corresponding value of 762,431, meaning that in Texas in 2020 there will be over 762,000 persons for each of its 39 House seats. When I compare Alabama to Texas, there will be a difference of around 61,000 persons per House seat.

However, when one apportions the House with apportionment data in which undocumented persons have been excluded, Alabama ends up with a population per seat value of 697,102 and Texas ends up with a corresponding value of 738,108. Comparing Alabama to Texas with these data, there is a difference of around 41,000 persons per House seat if the House apportionment is based on data excluding undocumented persons. The population per House seat difference between Alabama and Texas is significantly smaller if 2020 data excluding undocumented persons are employed in the apportionment calculations.

Discussion of Recent Apportionment Calculations Produced by Election Data Services

I produced my apportionment calculations and wrote the bulk of the above report in July and August of 2019. Although I entered some minor edits in early January of 2020, the bulk of my report and all the apportionment calculations were written and produced in July and August of 2019. Subsequent to my finishing my report, the Election Data Services (2019) produced in late December of 2019 new apportionment data based on Census Bureau estimates of the population counts of the states for July 2019. I will now discuss the results of these new estimates.

Election Data Services Inc (EDS) is a political consulting firm headquartered in Manassas, Virginia, with an office in Washington, DC. EDS is a well-respected research organization that specializes in the analysis and development of census and other federal and state data mainly dealing with elections. A profile of EDS on its webpage states that "Election Data Services was founded in 1977 and over the past 39 years has developed a variety of consulting services and political information products for businesses, associations, and governmental organizations" (https://www.electiondataservices.com/company-profile/, last visited on January 14, 2020). The motto of EDS is "Experts in Elections Redistricting and GIS."

The EDS apportionment data are more recent than the apportionment data I developed and presented in earlier sections of this report. My state projection data for 2020 were based on calculations from Census Bureau state population estimates for 2018. The EDS state projection data were based on calculations from Census Bureau state population estimates for 2019.

EDS produced nine different sets of state population projections for 2020, all of them based on the Census Bureau state population estimates for 2019. The Census Bureau state population estimates were population data for the states as of July 1, 2019. The EDS then projected forward these July 1, 2019 state estimates to April 1, 2020 (the data of the 2020 decennial census). The major issue for EDS to address was which trend line should be used to project forward the July 2019 data to April

2020. EDS decided to use nine different trends to project the 2019 data to 2020; several were based on short trends, i.e., from 2018 to 2019, from 2017 to 2019, and from 2016 to 2019; several were based on mid-length trends, i.e., from 2015 to 2019, from 2014 to 2019, and from 2013 to 2019; and several were based on long trends, i.e., from 2012 to 2019, from 2011 to 2019, and from 2010 to 2019.

As I noted above, in the state population projections to 2020 that I computed, I added in to the 2020 population projections counts for the states my estimates of what I believed the overseas populations of the states would be in 2020. I do not believe that the EDS entered overseas population data into their 2020 projection counts for the states. My 2020 projections for the states are thus closer to the actual 2020 apportionment populations of the states than are the EDS 2020 projections.

Of particular interest is the finding that although all nine of the EDS trend methods produced slightly different state population projections for 2020, all nine trend methods resulted in exactly the same apportionment results for all 50 states. Moreover, these apportionment results produced by the EDS are exactly the same as my apportionment results presented and discussed in earlier pages of this report and displayed in Table 2 of my report.

My results, and the EDS results, all showed that ten states would lose House seats in 2020, namely, Alabama -1 (from 7 to 6), California -1 (from 53 to 52), Illinois -1 (from 18 to 17), Michigan -1 (from 14 to 13), Minnesota -1 (from 8 to 7),

New York -1 (from 27 to 26), Ohio -1 (from 16 to 15), Pennsylvania -1 (from 18 to 17), Rhode Island -1 (from 2 to 1), and West Virginia -1 (from 3 to 2).

My results, and the EDS results, all showed that seven states would gain House seats in 2020, namely, Texas +3 (from 36 to 39), Florida +2 (from 27 to 29), Arizona +1 (from 9 to 10), Colorado +1 (from 7 to 8), Montana +1 (from 1 to 2), North Carolina +1 (from 13 to 14), and Oregon +1 (from 5 to 6).

The EDS did not produce expected apportionment results for 2020 for the states in which the numbers of undocumented immigrants had been removed from the apportionment populations, as I did in Column 8 of Table 2. Nevertheless, there is much to be gained by examining in more detail the EDS apportionment results for the state of Alabama.

All nine of the EDS apportionment results, as well as my apportionment results for the populations of the states including undocumented immigrants (Column 5 of Table 2), resulted in Alabama being assigned six seats in the House, a loss of one seat from the House apportionment following the 2010 census (Column 3 of Table 2). The EDS report observed that the data for all nine of its 2020 apportionments indicated that Alabama would have received its 7th seat as the 436th

assigned seat. But since only 435 seats are assigned, a practice observed since 1910 with one exception,[3] Alabama does not end up receiving a 7th seat.

The EDS report also shows how many more persons Alabama would need in its 2020 apportionment population to end up receiving a 7th seat. Examining all nine of the apportionment calculations produced by the EDS, Alabama needs between 10,072 and 19,074 additional persons in its 2020 population to obtain the 7th seat, depending on which of the nine calculations is used. This is a very small number of additional persons.

Now if we remove undocumented persons from the apportionment populations of all the states, Alabama realized a reduction of 58,979 persons. Only 18 states lose fewer persons in their apportionment populations when undocumented persons are removed, and 31 states lose more persons in their apportionment populations. On the basis only of the numerical differences, Alabama stands to benefit from this subtraction. Remember that all the EDS apportionment calculations shows that Alabama is in line for the 436th seat.

I reserve the right to supplement my report in light of additional facts, testimony and/or materials that may come to light.

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[3] When Alaska and Hawaii became states on January 3, 1959 and on August 21, 1959, respectively, the number of House seats was temporarily increased to 437. The number of seats remained at 437 until the 1960 apportionment following the decennial Census of 1960, when the number reverted back to 435 (Poston and Farris, 2017).

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the above information is true and correct to the best of my knowledge and belief.

Executed on January 23, 2020.

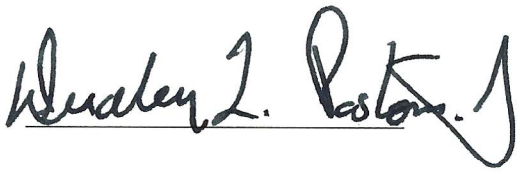

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TABLE 1. APPLICATION IN 2010 OF THE METHOD OF EQUAL PROPORTIONS: ALLOCATING THE FIRST SIX AND LAST FEW SEATS

Numbered seat in House	State	Numbered seat in the State	Priority value
First six seats			
51	California	2	26,404,774
52	Texas	2	17,867,470
53	California	3	15,244,803
54	New York	2	13,732,760
55	Florida	2	13,364,865
56	California	4	10,779,704
Last six seats			
430	South Carolina	7	716,890
431	Florida	27	713,364
432	Washington	10	711,868
433	Texas	36	711,857
434	California	53	711,308
435	Minnesota	8	710,231
Three seats beyond the 435th			
436	North Carolina	14	709,063
437	Missouri	9	708,459
438	New York	28	706,337

Source: (POSTON AND BOUVIER, 2017: 43)

TABLE 2. APPORTIONMENTS, 2010 & 2020

STATE	APPOR. POP. 2010	NUMBER OF APPORTIONED REPS. 2010 (SEATS)	APPOR. POP. 2020	NUMBER OF APPORTIONED REPS. 2020 (SEATS)	POP. PER SEAT	APPOR. POP. 2020 EXLCUDING UNDOCUMENTED PERSONS	NUMBER OF APPORTIONED REPS. EXCL. UNDOCUMENTED PERSONS 2020 (SEATS)	POP. PER SEAT
COL 1	**COL 2**	**COL 3**	**COL 4**	**COL 5**	**COL 6**	**COL 7**	**COL 8**	**COL 9**
Alabama	4,802,982	7	4,938,692	6	823,115.3	4,879,714	7	697,102.0
Alaska	721,523	1	755,887	1	755,887.0	748,445	1	748,445.0
Arizona	6,412,700	9	7,390,313	10	739,031.3	7,103,017	10	710,301.7
Arkansas	2,926,229	4	3,049,008	4	762,252.0	2,991,280	4	747,820.0
California	37,341,989	53	40,227,430	52	773,604.4	37,979,992	51	744,705.7
Colorado	5,044,930	7	5,880,439	8	735,054.9	5,681,125	8	710,140.6
Connecticut	3,581,628	5	3,579,818	5	715,963.6	3,454,788	5	690,957.6
Delaware	900,877	1	987,696	1	987,696.0	958,162	1	958,162.0
Florida	18,900,773	27	22,039,200	29	759,972.4	21,206,095	29	731,244.7
Georgia	9,727,566	14	10,771,446	14	769,389.0	10,363,804	14	740,271.7
Hawaii	1,366,862	2	1,442,429	2	721,214.5	1,395,056	2	697,528.0
Idaho	1,573,499	2	1,807,636	2	903,818.0	1,768,017	2	884,008.5
Illinois	12,864,380	18	12,752,058	17	750,121.1	12,345,060	17	726,180.0
Indiana	6,501,582	9	6,762,340	9	751,371.1	6,661,181	9	740,131.2
Iowa	3,053,787	4	3,191,340	4	797,835.0	3,137,219	4	784,304.8
Kansas	2,863,813	4	2,937,029	4	734,257.3	2,860,951	4	715,237.8
Kentucky	4,350,606	6	4,512,287	6	752,047.8	4,476,282	6	746,047.0
Louisiana	4,553,962	6	4,712,842	6	785,473.7	4,642,467	6	773,744.5
Maine	1,333,074	2	1,345,655	2	672,827.5	1,340,292	2	670,146.0
Maryland	5,789,929	8	6,127,292	8	765,911.5	5,852,341	8	731,542.6
Massachusetts	6,559,644	9	7,003,584	9	778,176.0	6,737,934	9	748,659.3
Michigan	9,911,626	14	10,052,287	13	773,252.8	9,952,047	13	765,542.1
Minnesota	5,314,879	8	5,699,715	7	814,245.0	5,603,020	8	700,377.5
Mississippi	2,978,240	4	3,002,329	4	750,582.3	2,981,390	4	745,347.5
Missouri	6,011,478	8	6,183,945	8	772,993.1	6,122,336	8	765,292.0
Montana	994,416	1	1,085,962	2	542,981.0	1,082,720	2	541,360.0
Nebraska	1,831,825	3	1,960,853	3	653,617.7	1,900,248	3	633,416.0
Nevada	2,709,432	4	3,128,072	4	782,018.0	2,906,704	4	726,676.0
New Hampshire	1,321,445	2	1,371,599	2	685,799.5	1,362,034	2	681,017.0
New Jersey	8,807,501	12	8,953,514	12	746,126.2	8,488,755	11	771,705.0
New Mexico	2,067,273	3	2,112,730	3	704,243.3	2,053,804	3	684,601.3
New York	19,421,055	27	19,626,547	26	754,867.2	18,921,551	26	727,752.0
North Carolina	9,565,781	13	10,629,214	14	759,229.6	10,300,749	14	735,767.8
North Dakota	675,905	1	785,782	1	785,782.0	780,309	1	780,309.0
Ohio	11,568,495	16	11,760,108	15	784,007.2	11,666,286	16	729,142.9
Oklahoma	3,764,882	5	4,005,355	5	801,071.0	3,917,552	5	783,510.4
Oregon	3,848,606	5	4,300,123	6	716,687.2	4,188,827	6	698,137.8
Pennsylvania	12,734,905	18	12,866,007	17	756,823.9	12,699,175	17	747,010.3
Rhode Island	1,055,247	2	1,061,190	1	1,061,190.0	1,031,552	1	1,031,552.0
South Carolina	4,645,975	7	5,221,881	7	745,983.0	5,133,501	7	733,357.3
South Dakota	819,761	1	905,371	1	905,371.0	899,076	1	899,076.0

TABLE 2. APPORTIONMENTS, 2010 & 2020

STATE	APPOR. POP. 2010	NUMBER OF APPORTIONED REPS. 2010 (SEATS)		APPOR. POP. 2020		NUMBER OF APPORTIONED REPS. 2020 (SEATS)	POP. PER SEAT	APPOR. POP. 2020 EXLCUDING UNDOCUMENTED PERSONS		NUMBER OF APPORTIONED REPS. EXCL. UNDOCUMENTED PERSONS 2020 (SEATS)	POP. PER SEAT	
COL 1	**COL 2**	**COL 3**		**COL 4**		**COL 5**	**COL 6**	**COL 7**		**COL 8**	**COL 9**	
Tennessee	6,375,431	9		6,907,615		9	767,512.8	6,770,095		9	752,232.8	
Texas	25,268,418	36		29,734,789		39	762,430.5	28,048,107		38	738,108.1	
Utah	2,770,765	4		3,268,506		4	817,126.5	3,164,173		4	791,043.3	
Vermont	630,337	1		631,006		1	631,006.0	630,380		1	630,380.0	
Virginia	8,037,736	11		8,686,344		11	789,667.6	8,392,351		11	762,941.0	
Washington	6,753,369	10		7,771,387		10	777,138.7	7,516,022		10	751,602.2	
West Virginia	1,859,815	3		1,800,621		2	900,310.5	1,797,033		2	898,516.5	
Wisconsin	5,698,230	8		5,856,748		8	732,093.5	5,780,760		8	722,595.0	
Wyoming	568,300	1		586,045		1	586,045.0	579,070		1	579,070.0	
		435				435	84,557.2	is s.d.		435	81,901.4	is s.d.

January 23, 2020

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PROFESSIONAL POSITIONS

Assistant Professor of Sociology (1970-75); Associate Professor of Sociology (1975-1981); Professor of Sociology (1981-1988), The University of Texas at Austin.

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Chair, Department of Rural Sociology, Cornell University, Ithaca, New York (1989-1992).

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Head, Department of Sociology, Texas A&M University, College Station, Texas (1992 - 1997).

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Research Associate, Population and Development Program, Cornell University, Ithaca, New York (1988-1992).

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President (2004-2005), President-Elect (2003-2004) and Vice-President (2002-2003), Southwestern Social Science Association

President, North American Chinese Sociologists Association, 1995-1997

Past-President and Member of Council, North American Chinese Sociologists Association, 1997-2003

President (1995-1999) and Member of Executive Committee (1999-2008), Research Committee 41 (Sociology of Population), International Sociological Association

President (1975-77) and Member of Executive Committee (1974-75), Southern Demographic Association (formerly Southern Regional Demographic Group)

President (1983-84), First Vice-President (1982-83), Second Vice-President (1981-82), and Member of Executive Committee (1977-79), Southwestern Sociological Association

Chair and Chair-Elect (1982-84) and Member of Council (1980-82), Population Section, American Sociological Association

Board of Directors (1980-81) and Member of Nominations Committee (1982-83), Population Association of America

Recipient, Distinguished Alumnus of the Year Award, University of Oregon, 1991

Recipient, Research Excellence Award of the Rural Sociological Society, 1994

Recipient, Distinguished Achievement in Research Award, Texas A&M University, Spring, 1998

Recipient, Distinguished Achievement in Teaching Award, College of Liberal Arts, Texas A&M University, Fall, 2000

Recipient, Distinguished Achievement in Graduate Mentoring, Texas A&M University, Spring, 2009

Recipient, Distinguished Service Award in Honor of Norma Williams, Southwestern Sociological Association, March, 2010

Recipient, Social Scientist of the Year Award, Southwestern Social Science Association, March, 2011 (this is the highest award given by the SSSA).

Fellow, American Association for the Advancement of Science (AAAS), elected November, 2014.

Member, U.S. Census Bureau Scientific Advisory Committee, 2005-2011

Member (1990-93) and Chair (1993-94), Publications Committee, Rural Sociological Society (1990-1994)

Member, Sociological Research Association (elected May, 1984)

Member, Alpha Kappa Delta (elected to Mu chapter of California, 1964)

Member, Gamma Sigma Delta (elected to Cornell University chapter, 1991)

Member, Phi Beta Delta (elected to Alpha Eta chapter of Texas A&M University, 1993)

Member, Phi Kappa Phi (elected to Texas A&M University chapter, 1999)

Member, Consulting Board, Center for Immigration Research, University of Houston (1996 – 2006)

Representative to the Association of College Honor Societies, Council of United Chapters of Alpha Kappa Delta (1984-1994)

Member, Nominations Committee, American Sociological Association (1994-96)

Member, Committee on Certification and Licensure, American Sociological Association (1996-99)

Member, Diversity Committee, Rural Sociological Society (1995-1999)

Chair, Subcommittee on Mentoring and Climate, Rural Sociological Society (1995-1997)

Witness, Hearings before the Select Committee on Population, U.S. House of Representatives, Ninety-fifth Congress (1979)

Member, Committee on Public Affairs, American Statistical Association (2001 – 2008)

Member, W.J. Smith Scholarship Committee, American Statistical Association (2006 – present)

Representative of the American Statistical Association to the Committee on Statistics (Section U) of the American Association for the Advancement of Science (2017 – 2020)

Member of Council, Section on Evolution, Biology and Society, American Sociological Association (2015-2018)

Chair, Section on Evolution, Biology and Society, American Sociological Association (2018-2019)

INDIVIDUAL RESEARCH GRANTS AND CONTRACTS

Office of the Commissioner, Coordinating Board, Texas College and University System, "Projections of the Population of the College-Age Population of Texas Counties," 1972-73, $18,000, principal investigator.

Office of Information Services, Office of the Governor, State of Texas, "Demographic Analyses of the Texas Population," 1972-73, $12,000, principal investigator.

Texas State Department of Public Welfare, "Population Projections for Texas and Metropolitan Areas," 1975-76, $18,000, principal investigator.

Texas State Department of Public Welfare, Planning Division, "Social and Demographic Analyses of Texas Counties and Census Tracts," 1975-76, $27,000, co-principal investigator with W.P. Frisbie.

Texas State Department of Public Welfare, Planning Division, "Stability of Analyses of Texas Population," 1976-77, $13,000, principal investigator.

National Science Foundation, "The Effect of Military Service on Minority Veterans' Civilian Earnings," 1976-78, $60,600, principal investigator (co-investigators, H.L. Browning and J.S. Butler).

Bureau of State Health Planning and Resource Development, "The Relationship of Health and Demographic and Socioeconomic Variables in Texas Counties," 1977, $19,000, co-principal investigator with W.P. Frisbie.

Texas State Department of Human Resources, "Projections for Texas Counties By Age and Selected Percentages of State Median Income," 1978, $3,500, principal investigator.

Texas State Department of Health, "Methodologies for Estimating and Projecting the Populations of Texas Counties," 1978-79, $35,000, co-principal investigator with O.R. Galle and A. Palloni.

National Institute of Child Health and Human Development, "Childlessness and Status Attainment," 1979-80, $40,000, principal investigator.

National Science Foundation, "Effects of Military Service on Civilian Socioeconomic Attainment," 1979-80, $12,000, principal investigator.

Office of the Governor, State of Texas, "Race-ethnic Projections of the Populations of Texas Regions, 1980-2000," 1980, $3,200, principal investigator.

University Research Institute, The University of Texas at Austin, "Childlessness Trends and Patterns," 1980, $13,000, principal investigator.

National Institute of Child Health and Human Development, "Ecological Models of Migration," 1981-82, $84,000, co-principal investigator with W.P. Frisbie.

National Institute of Child Health and Human Development, "The Demography of Family and Household Structure Among Hispanics, Blacks, and Anglos," 1981-84, $380,000, co-principal investigator with W.P. Frisbie and F.D. Bean.

National Institute of Child Health and Human Development, "International Patterns of Childlessness," 1981-84, $65,000, principal investigator.

City of Austin, Human Services Department, "A Social Area Analysis of Austin and Travis County," 1983, $1,850, principal investigator.

Capital Area Planning Council, "Projections of the Capital Area Planning Region," 1983-84, $8,400, co-principal investigator with J. Olson.

Office of Adolescent Pregnancy, "Adoption Behavior and the Propensity to Adopt," 1983-87, $66,374, principal investigator.

Policy Research Institute, The University of Texas at Austin, "Status Integration and Chronic Disease Mortality in Austin Neighborhoods," 1984, $4,700, principal investigator.

Policy Research Institute, The University of Texas at Austin, "Voluntary Childlessness in Egypt: An Investigation of its Presence and Characteristics," 1986, $3,000, principal investigator.

National Institute of Child Health and Human Development, "Nonmarital Fertility Patterns," 1986-88, $58,000, co-principal investigator with W. R. Kelly.

University Research Institute, The University of Texas at Austin, "Development and Childlessness in Taiwan," 1987, $24,000, principal investigator.

Social Science Research Council, "Latino Economic Attainment Patterns," 1987-1988, $53,000, principal investigator.

Pacific Cultural Foundation, Taipei, Taiwan, "Voluntary and Involuntary Childlessness in Taiwan," 1987-88, $1,500, principal investigator.

The Ford Foundation, "Hispanic Socioeconomic Data Base," 1989-1990, $10,000, principal investigator.

The Rockefeller Foundation, "Woman's Status and Fertility in the Republic of Korea," 1989-1990, $40,000, principal investigator (co-principal investigator, H.G. Kim, Yeungnam University, Republic of Korea).

Cornell Agricultural Experiment Station, "Racial and Ethnic Socioeconomic Attainment Patterns in New York and Northeast United States," 1989-1991, $4,375 each year, principal investigator.

National Institute of Child Health and Human Development, "China's One Child Policy and Children's Outcomes," 1989-1992, $580,000 ($220,000 to Cornell University and Texas A&M University), co-principal investigator with T. Falbo.

New York Lung Association, "Chronic Lung Disease Mortality in New York State," 1990-1992, $34,545, co-principal investigator with T. Hirschl.

U.S. Department of Agriculture, (with R. Sáenz, J. Singelmann, and T. Slack), “Race and Place: Patterns and Dynamics of Poverty in the Texas Borderland and the Lower Mississippi Delta,”, $499,552.00; September 1, 2007 through 2011-2012.

INSTITUTIONAL GRANTS:

At Cornell University (1988-1992):

Hewlett Foundation, General Support for Foreign Student Training in Population and Development, 1988-1993, research associate, $560,000,

At The University of Texas at Austin (1971-1988):

National Institute of Child Health and Human Development, Core Support Grant, Population Research Center, 1971-76, research associate, $320,000.

National Institute of Child Health and Human Development, Core Support Grant, Population Research Center, 1976-1981, research associate, $550,000.

National Institute of Child Health and Human Development, Training Grant in Population, Population Research Center, 1977-82, principal investigator, $250,000.

The Hewlett Foundation, Training Program in Latin American Demography, Population Research Center, 1979-1982, professor, $120,000.

National Institute of Child Health and Human Development, Core Support Grant, Population Research Center, 1981-1986, principal investigator, $850,000.

National Institute of Child Health and Human Development, Training Grant in Population, Population Research Center, 1982-87, principal investigator, $325,000.

The Hewlett Foundation, Research and Training in Latin American, Mexican and Mexican-Origin Population Studies, Population Research Center, 1983-85, professor, $225,000.

Office of the Vice-President for Academic Affairs and Research, The University of Texas at Austin, Core and Administrative Support for Population Research Center, annually, associate director and research associate (1970-80), principal investigator (1981-1986), research associate (1987-1988), $54,981 (1984-85).

National Institute of Child Health and Human Development, Core Support Grant, Population Research Center, 1986-1991, principal investigator (1986), research associate (1987-1988), $1,400,000.

The Hewlett Foundation, Research and Training in Population Studies, Population Research Center, 1986-1991, professor (1986-1988), $650,000.

EDITORIAL EXPERIENCE

Series Editor, *International Handbooks of Population*, 2006-present (seven *Handbook* have been published, and several more Handbooks are under contract)

Corresponding Editor, *SINET: Social Indicators Network News*,1996-present

Editorial Board, *Demographic Research*, 2002 - 2010.

Editorial Committee of 人口研究 (*Population Research*), the top-rated demography journal in all of China. 人口研究 is published bimonthly at Renmin (People's) University, Beijing, China, 2012 – present.

Editorial Board of **人口學刊** (*Population Studies*), the major demography journal in Taiwan. **人口學刊** is published quarterly at the National Taiwan University, Taipei, Taiwan, 2011-present.

Editorial Board, *Population Research and Policy Review*, 2000 – 2012

Editorial Board, *Social Biology*, 2000 – 2007.

Associate Editor, *Social Science Quarterly*, 1973-1997.

Consulting Editor, *American Journal of Sociology*, 1979-82; 1993-1995.

Associate Editor, *Sociological Perspectives*, 1972-1990.

Associate Editor, *Sociological Forum*, 1988-1992.

Board of Advisory Editors, *Sociological Inquiry*, 1987-1993.

Editorial Board, *Rose Monograph Series* of the American Sociological Association, 1989-1992.

Editorial Board, Cornell East Asia Publication Series, 1990-1992.

Board of Editors, Rural Studies Series, The Rural Sociological Society, 1991-1994.

Associate Editor, *Rural Sociology*, 1990-1992.

Deputy Editor, *Demography*, 1984.

Panelist and/or Ad Hoc Reviewer, Center for Population Research, NICHD, NIH, 1977, 1979, 1981, 1984, 1990, 1993, 1998 (twice), 1999, 2000 (twice).

Outside Reviewer, National Science Foundation, 1978, 1979, 1981, 1982 (twice), 1983, 1984, 1987, 1989, 2009-11, 2014

PUBLICATIONS:

BOOKS:

1. J. Hazleton, K.E. Haynes and **D.L. Poston, Jr**. *Austin and the Future: The Challenge of Growth*. The University of Texas at Austin, L.B.J. School of Public Affairs, 1973.

2. W.P. Frisbie and **D.L. Poston, Jr**. *Sustenance Organization and Migration in Nonmetropolitan America*. Iowa City, Iowa: The University of Iowa, Iowa Community Research Center, 1978.

3. C. Kaplan, T. VanValey, B. Dent, J. Goldsteen, L. Love, **D.L. Poston, Jr**., L. Solomon, Jr., J. Van Matre and F. Williams. *Census '80: Continuing the Factfinder Tradition*. Washington, D.C.: U.S. Government Printing Office, 1980.

4. **D.L. Poston, Jr**. and R.H. Weller (editors). *The Population of the South: Structure and Change in Social Demographic Context*. The University of Texas Press, 1981.

5. G. Gaburro and **D.L. Poston, Jr**. (editors). *Essays on Population Economics*. Padua, Italy: CEDAM, 1991.

6. **D.L. Poston, Jr.** and D. Yaukey (editors). *The Population of Modern China*. New York: Plenum Press, 1992.

7. L.F. Bouvier and **D.L. Poston, Jr**. *Thirty Million Texans?* Washington, D.C.: Center for Immigration Studies, 1993.

8. T. Falbo, **D.L. Poston**, and Z. Xie (editors). *Zhongguo Dusheng Zinu Yanjiu* (*Research on Single Children in China*). Shanghai: Huadong Shifan Daxue Chubaoshe (East China Normal University Press), 1996 (in Chinese).

9. M. Micklin and **D.L. Poston, Jr.** (editors). *Continuities in Sociological Human Ecology*. New York: Plenum Press, 1998.

10. Alvin Y. So, Nan Lin, **Dudley L. Poston, Jr**. (editors). *The Chinese Triangle of Mainland China, Taiwan and Hong Kong: Comparative Institutional Analyses.* Westport, Connecticut: Greenwood Press, 2001.

11. **Dudley L. Poston, Jr.** and Michael Micklin (editors). *Handbook of Population*. New York: Springer Publishers, 2005.

12. **Dudley L. Poston, Jr**., Che-Fu Lee, Chiung-Fang Chang, Sherry L. McKibben, and Carol S. Walther (editors). *Fertility, Family Planning, and Population Policy in China*. London, England: Routledge Publishers, 2006.

13. Yi Zeng, **Dudley L. Poston, Jr**., Denese Ashbaugh Vlosky, and Danan Gu (editors). *Healthy Longevity in China: Demographic, Socioeconomic, and Psychological Dimensions*. New York: Springer Publishers, 2008.

14. Amanda K. Baumle, D'Lane Compton, and **Dudley L. Poston, Jr**. 2009. *Same-Sex Partners: The Social Demography of Sexual Orientation*. New York: SUNY Press.

15. Joseph Tucker, **Dudley L. Poston**, Qiang Ren**,** Baochang Gu, Xiaoying Zheng, Stephanie Wang, and Chris Russell. *Gender Policy and HIV in China: Catalyzing Policy Change***.** New York: Springer, 2009.

16. **Dudley L. Poston, Jr**., and Leon F. Bouvier. *Population and Society: An Introduction to Demography*. New York, NY: Cambridge University Press, 2010.

17. **Dudley L. Poston, Jr.,** Wen Shan Yang, and D. Nicole Farris (editors), with assistance of Cathy Ruey-Ling Chu, , Heather Terrell Kincannon, and Rachel Traut Cortes. *The Family and Social Change in Chinese Societies.* New York, NY: Springer Publishers, 2014.

18. **Dudley L. Poston, Jr**., and Leon F. Bouvier. *Population and Society: An Introduction to Demography*.2nd edition. New York, NY: Cambridge University Press, 2017.

19. **Dudley L. Poston, Jr.**, Samsik Lee, and Hangon Kim (editors). *Low Fertility Regimes and Demographic and Societal Change*. New York, NY: Springer Publishers, 2018.

20. **Dudley L. Poston, Jr.** (editor). *Handbook of Population*. 2nd edition. Cham: Switzerland: Springer Nature, 2019.

21. Joachim Singelmann and **Dudley L. Poston, Jr.** (editors). *Developments in Demography in the 21st Century*. New York, NY: Springer Publishers, Forthcoming 2019-2020.

ARTICLES, CHAPTERS, FINAL REPORTS, AND RELATED ITEMS:

1. B.S. Bradshaw and D.L. Poston, Jr. "Texas Population in 1970: Trends, 1950-1970." *Texas Business Review* XLV (May, 1971): 97-109.

2. D.L. Poston, Jr. and B.S. Bradshaw. "Texas Population in 1970: Trends in Age Composition, 1940-1970." *Texas Business Review* XLV (October, 1971): 209-219.

3. D.L. Poston, Jr. and G. Johnson. "Industrialization and Professional Differentiation by Sex in the Metropolitan Southwest." *Social Science Quarterly* 52 (September, 1971): 331-348.

4. D.L. Poston, Jr. and J. Passel. "Texas Population in 1970: Racial Residential Segregation in Cities." *Texas Business Review* XLVI (July, 1972): 142-147.

5. D.L. Poston, Jr., B.S. Bradshaw and D. DeAre. "Texas Population in 1970: Trends in Natural Decrease, 1950-1970." *Texas Business Review* XLVI (November, 1972): 239-247.

6. F.D. Bean, D.L. Poston, Jr. and H.S. Winsborough. "Size, Functional Specialization, and the Classification of Cities." *Social Science Quarterly* 53 (June, 1972): 20-32.

7. D.L. Poston, Jr. "Socio-Economic Status and Work-Residence Separation in Metropolitan America." *The Pacific Sociological Review* 15 (July, 1972): 367-380.

8. H.L. Browning and D.L. Poston, Jr. "Population and the American Future: A Discussion and Introduction to a Review Symposium." *Social Science Quarterly* 53 (December, 1972): 445-451.

9. W.T. Martin and D.L. Poston, Jr. "The Occupational Composition of White Females: Sexism, Racism and Occupational Differentiation." *Social Forces* 50 (March, 1972): 349-355.

10. K.E. Haynes, D.L. Poston, Jr. and P. Schnirring. "Intermetropolitan Migration in High and Low Opportunity Areas: Indirect Tests of the Distance and Intervening Opportunities Hypothesis." *Economic Geography* 49 (January, 1973): 68-73.

11. D.L. Poston, Jr. and D. DeAre. "Texas Population in 1970: Trends and Variations in the Populations of Nonmetropolitan Towns." *Texas Business Review* XLVII (January, 1973): 11-16.

12. R.S. Cooney and D.L. Poston, Jr. "Texas Population in 1970: The Changing Status of Women." *Texas Business Review* XLVII (March, 1973): 64-68.

13. H.L. Browning, S.C. Lopreato and D.L. Poston, Jr. "Income and Veteran Status: Variations Among Mexican Americans, Blacks, and Anglos." *American Sociological Review* 38 (February, 1973): 74-85.

14. D.L. Poston, Jr. and D. Alvirez. "On the Cost of Being a Mexican American Worker." *Social Science Quarterly* 53 (March, 1973): 697-709

Reprinted in *Chicanos: Social and Psychological Perspectives*, Carrol Hernandez, Marsha J. Haug and Nathaniel W. Wagner, editors. St. Louis: C.V. Mosby Co., 1975.

Reprinted in *Social Inequality: Class, Ethnicity, Sex, Age*, H. Edward Ransford and Vincent Jeffries, editors. Boston: Allyn and Bacon, Inc., 1980.

15. D.L. Poston, Jr. "Population Projections for Texas Counties: 1980 to 2020." Final Report of Research conducted for the Office of Information Services, Office of the Governor, 1973, 35 pp.

16. D.L. Poston, Jr. "Texas Population in 1980 and 1990." Final Report of Research conducted for the Office of Information Services, Office of the Governor, 1973, 37 pp.

17. D.L. Poston, Jr., J.H. Gundlach and D. Conway. "Population Projections of the College-Age Population of Texas Counties from 1973 to 1985." Final Report of Research conducted for the Office of the Commissioner, Coordinating Board, Texas College and University System, 1973, 151 pp.

18. D.L. Poston, Jr. and Associates. "Demographic Analyses of the Texas Population." Pp. 1-104 in *Demography of the South*, Vol. III, *The West South Central Region*. Oak Ridge, Tennessee: Southern Regional Demographic Group, 1973.

19. D.L. Poston, Jr. "An Examination of Urban Mortality Using Age-Adjusted Death Rates." *Social Science Quarterly* 55 (June, 1974): 182-188.

20. D.L. Poston, Jr. "Income and Childlessness: Is the Relationship Always Inverse?" *Social Biology* 3 (Fall, 1974): 296-307.

21. J.P. Gibbs and D.L. Poston, Jr. "The Division of Labor: Conceptualization and Related Measures." *Social Forces* 53 (March, 1975): 468-475.

22. D.L. Poston, Jr., and J. Singelmann. "Socioeconomic Status, Value Orientations, and Fertility Behavior in India." *Demography* 12 (August, 1975): 417-430.

23. W.P. Frisbie and D.L. Poston, Jr. "Components of Sustenance Organization and Population Change in Nonmetropolitan Areas: A Human Ecological Investigation." *American Sociological Review* 40 (December, 1975): 773-784.

24. D.L. Poston, Jr., "Demographic Techniques and Methods in Undergraduate Courses in Population Problems: Are They Necessary?" *Teaching Notes on Population* VI (Fall/Winter, 1975): 31-44.

25. W.T. Martin and D.L. Poston, Jr. "Industrialization and Occupational Differentiation: An Ecological Investigation." *Pacific Sociological Review* 19 (January, 1976): 82-97.

26. D.L. Poston, Jr., D. Alvirez and M. Tienda. "Earnings Differences Between Anglo and Mexican American Male Workers in 1960 and 1970: Changes in the `Cost' of Being Mexican American." *Social Science Quarterly*, 57 (December, 1976): 618-631.

27. D.L. Poston, Jr. "The Fertility Control Revolution and the Future of Working Women in the United States." In *Women in Management* (M. Gerrard, editor). Austin, Texas: School of Social Work, The University of Texas at Austin, 1976.

28. W.P. Frisbie and D.L. Poston, Jr. "The Structure of Sustenance Organization and Population Change in Nonmetropolitan America." *Rural Sociology* 41 (Fall, 1976): 354-370.

29. D.L. Poston, Jr. "Characteristics of Voluntarily and Involuntarily Childless Wives." *Social Biology* 23 (September, 1976): 198-209.

30. D.L. Poston, Jr. "Population Projections for Texas and Metropolitan Areas: Description and Technical Documentation." Final Report of Research conducted for the Texas State Department of Public Welfare, 1976, 22 pp.

31. W.P. Frisbie, D.L. Poston, Jr. and I. Eberstein. "Social, Demographic and Economic Characteristics of Texas Counties and Census Tracts: A Description and a Social Area Analysis." Final Report of Research conducted for the Texas State Department of Public Welfare, 1976, two volumes.

32. D. Conway, K. Haynes, D.L. Poston, Jr., I. Manners and H. Savage. "The Dallas-Fort Worth Region." Pp. 1-40 of *Contemporary Metropolitan America*, Vol. 4, *Twentieth Century Cities*, (J.S. Adams, editor). Cambridge, Mass.: Ballinger Publishing Company, 1976.

33. D.L. Poston, Jr. "Zero Population Growth for Texas?" *Discovery* 1 (December, 1976): pp. 24-27.

34. W.P. Frisbie, D.L. Poston, Jr., E.D. Stokes and V.L. Kiplinger. "Health Indicators as Related to Social, Economic and Demographic Variables: A Factorial Ecology of Texas Counties." Final Report of Research conducted for the Bureau of State Health Planning and Resource Development, 1977, 85 pp.

35. D.L. Poston, Jr. and V.L. Kiplinger. "Factor Stability in Texas Counties: An Examination of Social, Economic and Demographic Dimensions in 1960 and 1970." Final Report of

Research conducted for the Texas State Department of Public Welfare Planning Division, 1977, 66 pp.

36. S.C. Lopreato and D.L. Poston, Jr. "Differences in Earnings and Earnings Ability Between Black Veterans and Nonveterans in the United States." *Social Science Quarterly* 57 (March, 1977): 750-766.

37. W.T. Martin and D.L. Poston, Jr. "Differentials in the Ability to Convert Education into Income: The Case of the European Ethnics." *International Migration Review* 11 (Summer, 1977): 215-231.

38. D.L. Poston, Jr. and E. Gotard. "Trends in Childlessness in the United States, 1910-1975." *Social Biology* 24 (Fall, 1977): 212-234.

39. J.H. Vanston, W.P. Frisbie, S.C. Lopreato and D.L. Poston, Jr. "Alternate Scenario Planning." *Technological Forecasting and Social Change* 10 (March, 1977): 159-180.

40. D.L. Poston, Jr. "Population Projections for Texas Counties by Age Groups and Selected Percentages of State Median Income." Final Report of Research conducted for the Texas State Department of Human Resources, 1978, 127 pp.

41. W.P. Frisbie and D.L. Poston, Jr. "Sustenance Differentiation and Population Redistribution." *Social Forces* 57 (September, 1978): 42-56.

42. D.L. Poston, Jr. and R. White. "Indigenous Labor Supply, Sustenance Organization, and Population Redistribution in Nonmetropolitan America: An Extension of the Ecological Theory of Migration." *Demography* 15 (November, 1978): 637-641.

43. M. Martindale and D.L. Poston, Jr. "Variations in Veteran-Nonveteran Earnings Patterns Among World War II, Korea, and Vietnam War Cohorts." *Armed Forces and Society* 5 (February, 1979): 219-243.

44. D.L. Poston, Jr. "The Influence of Military Service on the Civilian Earnings Patterns of Blacks, Mexican Americans and Anglos." *Journal of Political and Military Sociology* 7 (Spring, 1979): 71-88.

45. D.L. Poston, Jr. "Immigration to the United States: Issues, Trends, and Prospects." Pp. 363-373 in *World Population: A Global Perspective: Hearings Before the Select Committee on Population*, U.S. House of Representatives, Ninety-Fifth Congress. Washington, D.C.: U.S. Government Printing Office, 1979.

46. D.L. Poston, Jr. "Military Service and Civilian Earnings Patterns of Black and Mexican American Men." Final Report of Research Grant No. SOC-76-10665 to the National Science Foundation, 1979, 98 pp.

47. D.L. Poston, Jr. and O.R. Galle. "Population Projections for Texas Districts by Age, Sex and Race-Ethnic Group: 1980, 1990, 2000, 2010." Final Report of Research Conducted for the Texas Department of Health, 1979, 47 pp.

48. D.L. Poston, Jr. "Nature and Implications of Population Growth." Chapter 13 in *Fertility Control: Biological and Sociological Aspects*. Edited by C. Pauerstein and R. Shain. New York: Harper and Row, 1980, pp. 173-180.

49. D.L. Poston, Jr. and H.L. Browning. "The Basic Population Model and the Data and Methods of Demography." Chapter 14 in *Fertility Control: Biological and Sociological Aspects*. Edited by C. Pauerstein and R. Shain. New York: Harper and Row, 1980, pp. 181-196.

50. H.L. Browning and D.L. Poston, Jr. "The Demographic Transition." Chapter 15 in *Fertility Control: Biological and Sociological Aspects*. Edited by C. Pauerstein and R. Shain. New York: Harper and Row, 1980, pp. 197-203.

51. H.L. Browning and D.L. Poston, Jr. "Planned Intervention in Population Change." Chapter 16 in *Fertility Control: Biological and Sociological Aspects*. Edited by C. Pauerstein and R. Shain. New York: Harper and Row, 1980, pp. 204-214.

52. D.L. Poston, Jr. and H.L. Browning. "Four Case Studies: Mexico, India, China, United States of America." Chapter 17 in *Fertility Control: Biological and Sociological Aspects*. Edited by C. Pauerstein and R. Shain. New York: Harper and Row, 1980, pp. 215-232.

53. W.T. Martin, D.L. Poston, Jr. and J. Goodman. "Converting Education into Income and Occupational Status: Another Look at the European Ethnics." *Pacific Sociological Review* 23 (July, 1980), 297-314.

54. D.L. Poston, Jr. "An Ecological Analysis of Migration in Metropolitan America, 1970-75." *Social Science Quarterly* 61 (December, 1980): 418-433.

55. S. South and D.L. Poston, Jr. "Stability in the U.S. Metropolitan System, 1970." *Demography* 17 (November, 1980): 445-450.

56. J.M. Inman and D.L. Poston, Jr. "Variations in Occupational Status Differences by Sex in U.S. Metropolitan Areas, 1970." *Proceedings of the Social Statistics Section of the American Statistical Association, 1980*. Washington, D.C.: American Statistical Association, 1980: 196-201.

57. D.L. Poston, Jr. "Ethnic Statistics and Current Demographic Research: A Discussion." *Proceedings of the Social Statistics Section of the American Statistical Association, 1980*. Washington, D.C.: American Statistical Association, 1980: 97.

58. D.L. Poston, Jr. "The Use of Census Data by Social Demographers." Chapter 16 in *Census '80: Continuing the Factfinder Tradition*. By C. Kaplan and T. VanValey and Associates. Washington, D.C.: U.S. Government Printing Office, 1980, pp. 413-432.

59. D.L. Poston, Jr., W.J. Serow, R.H. Weller. "Demographic change in the South." Chapter 1 in *The Population of the South: Structure and Change in Social Demographic Context*. Edited by D.L. Poston, Jr. and R.H. Weller. The University of Texas Press, 1981.

60. D.L. Poston, Jr. "An Ecological Examination of Southern Population Redistribution, 1970-1975." Chapter 5 in *The Population of the South: Structure and Change in Social Demographic Context*. Edited by D.L. Poston, Jr. and R.H. Weller. The University of Texas Press, 1981.

61. D.L. Poston, Jr. and M.T. Coleman. "The Mechanics of Congressional Apportionment." *Intercom* 9 (January, 1981): 8-10.

62. D.L. Poston, Jr. "Manipulating Population Counts." *Society* 18 (January/February, 1981): 15-17.

63. D.L. Poston, Jr. "The Effects of Military Service on the Civilian Earnings of White Veterans and Nonveterans." Final Report of Research Grant No. SOC-78-05283 to the National Science Foundation, 1981, 34 pp.

64. D.L. Poston, Jr. and K.B. Kramer. "Patterns of Voluntary and Involuntary Childlessness in the United States, 1955-1973." Final Report of Contract No. 1-HD-92804 to the National Institute of Child Health and Human Development, 1981, 121 pp.

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DUDLEY L. POSTON, JR.

List of Publications 2010 to 2020

BOOKS:

1. Dudley L. Poston, Jr., and Leon F. Bouvier. *Population and Society: An Introduction to Demography*. New York, NY: Cambridge University Press, 2010.

2. Dudley L. Poston, Jr., Wen Shan Yang, and D. Nicole Farris (editors), with assistance of Cathy Ruey-Ling Chu, Heather Terrell Kincannon, and Rachel Traut Cortes. *The Family and Social Change in Chinese Societies.* New York, NY: Springer Publishers, 2014.

3. Dudley L. Poston, Jr., and Leon F. Bouvier. *Population and Society: An Introduction to Demography*.2nd edition. New York, NY: Cambridge University Press, 2017.

4. Dudley L. Poston, Jr., Samsik Lee, and Hangon Kim (editors). *Low Fertility Regimes and Demographic and Societal Change*. New York, NY: Springer Publishers, 2018.

5. Dudley L. Poston, Jr. (editor). *Handbook of Population*. 2nd edition. Cham: Switzerland: Springer Nature, 2019.

6. Joachim Singelmann and Dudley L. Poston, Jr. (editors). *Developments in Demography in the 21st Century*. New York, NY: Springer Publishers, Forthcoming 2020.

ARTICLES, CHAPTERS, FINAL REPORTS, AND RELATED ITEMS:

1. Kayla Fontenot, Joachim Singelmann, Tim Slack, Carlos Siordia, Dudley L. Poston, Jr., and Rogelio Sáenz. 2010. "Understanding Falling Poverty in the Poorest Places: An Examination of the Experience of the Texas Borderland and Lower Mississippi Delta, 1990–2000." *Journal of Poverty* 14: 216-236.

2. Dudley L. Poston, Jr., Joachim Singelmann, Carlos Siordia, Tim Slack, Bruce A. Robertson, Rogelio Sáenz, and Kayla Fontenot. 2010. “Spatial Context and Poverty: Area-level Effects and Micro-level Effects on Household Poverty in the Texas Borderland and Lower Mississippi Delta: United States, 2006.” *Applied Spatial Analysis and Policy* 3: 139-162.

3. Dudley L. Poston, Jr. and Amanda K. Baumle. 2010. “Patterns of Asexuality in the United States.” *Demographic Research* 23: 509-530: http://www.demographic-research.org/Volumes/Vol23/18/23-18.pdf

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6. Carol S. Walther, Dudley L. Poston, Jr., and Yuan Gu. 2011. “Ecological Analyses of Gay Male and Lesbian Partnering in the Metropolitan United States in 2000.” *Population Research and Policy Review* 30:419-448.

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EXHIBIT E

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ALABAMA SOUTHERN DIVISION

STATE OF ALABAMA, and MORRIS J. BROOKS, JR., Representative for Alabama's 5th Congressional District, *Plaintiffs*, v. UNITED STATES DEPARTMENT OF COMMERCE, et al. *Defendants*, And DIANA MARTINEZ, et al., *Defendant-Intervenors*, COUNTY OF SANTA CLARA, CALIFORNIA, et al, *Defendant-Intervenors*, And STATE OF NEW YORK, et al., *Defendant-Intervenors.*	Civil Action No. 2:18-cv-00772-RDP

SUPPLEMENT TO SWORN DECLARATION AND EXPERT REPORT OF DUDLEY L. POSTON, JR., Ph.D.

The Development of Apportionment Data for 2020 Based on 2019 State Population Estimates by the U.S. Census Bureau

As I have noted in my Sworn Declaration and Expert Report ("report"), I produced the apportionment calculations and wrote the bulk of the report in July and August of 2019. While I wrote an additional section of the report in mid-January

2020 commenting on new materials and data provided by Election Data Services (2019), the bulk of the report and all the apportionment calculations were written and produced in July and August of 2019. My apportionment data in the report used 2020 population projection data that I developed that were based on population estimates for 2018 of the resident populations of the 50 states that were prepared by the U.S. Census Bureau (U.S. Census Bureau, 2018).

In late 2019, the U.S. Census Bureau produced estimates of the population counts of the resident populations of the states for July 2019 (U.S. Census Bureau, 2019). With these 2019 data, I have updated my apportionment data and results as presented in the report. In this Supplement to Sworn Declaration and Expert Report ("Supplement"), I discuss my methods and present these updated results.

My first task was to use the new 2019 Census Bureau estimates to develop apportionment population data for 2020 for each of the 50 states. In Table 3, I present the names of the states in Column 1, followed in Column 2 by their actual 2010 apportionment population counts. In Column 3, I show the number of House seats each of the states was assigned in 2010. Alabama was assigned seven in the 2010 apportionment of the House, and my home state of Texas was assigned 36.

In Column 4, I present what I have projected to be the 2020 apportionment populations of each of the 50 states, based on the newly released 2019 state population estimates of the resident populations. As in the report, I use as the

definition of the apportionment population the resident population of the state in 2020 plus the "overseas population" from that state, that is, those U.S. government employees and members of the military, and their dependents, serving overseas, who claim the state as their "state of record."

Here is how I developed the projections for 2020 shown in Column 4 of Table 3 for the resident populations of the 50 states. I first took the above-mentioned estimated state resident populations for 2019 that were produced by the U.S. Census Bureau in late 2019 (U.S. Census Bureau, 2019). I subtracted from these 2019 estimates the 2010 census counts of their resident populations. I then annualized these 2010–2019 differences, multiplied them by one, and then added them to the 2019 population estimates, to yield 2020 projected counts of the resident populations of the states.

Next, to determine the projected counts of the 2020 overseas populations of the states, I calculated the proportion of each state's 2010 resident population to the number of overseas persons in 2010. I then multiplied these 2010 overseas proportions by the 2020 resident populations of the states I produced and just discussed in the previous paragraph. I then added these estimates of the 2020 overseas population counts to the 2020 resident populations to produce the projections of the 2020 apportionment populations. These are the projected apportionment population counts reported for the states in Column 4 of Table 3.

I next used these apportionment population counts in Column 4 to apportion the House for 2020, using the Method of Equal Proportions. The numbers of House seats for the 50 states are presented in Column 5 of Table 3. Note that when the 2020 apportionment data and resulting seat assignments are based on the 2019 Census Bureau estimates of the resident populations, Alabama ends up receiving six seats in 2020, a loss of one seat from the seven received by Alabama in 2010. My home state of Texas ends up receiving 39 seats in 2020, which is a gain of three seats from the 36 seats Texas received in 2010. The seat assignment results for the 50 states that are shown in Column 5 of Table 3 are exactly the same as the seat assignments shown in Column 5 of Table 2, the table showing the allocation of seats based on the Census Bureau state population estimates for 2018. Thus, the House seat assignments based on the newly available Census Bureau estimates for 2019 are the same as the House seat assignments based on the Census Bureau estimates for 2018.

I next developed population projections for 2020 for the populations of the 50 states excluding the undocumented persons estimated to be residing in the states in 2020. The apportionment data for the states based on these projections are presented in Column 7 of Table 3. I developed these projections in the following way.

I first estimated the number of undocumented immigrants residing in the states in 2020. I obtained data from the Pew Research Center (Pew Research Center, 2019) on the estimated numbers of undocumented immigrants residing in the 50 states in

2016. I then multiplied the proportions of undocumented immigrants in each state in 2016 by the states' projected 2020 resident populations and subtracted the resulting numbers from their 2020 resident populations. I then added in my estimates of the state's overseas population, as discussed above. My assumption is that the proportions of undocumented immigrants in the states in 2016 will be the same proportions in 2020. These projected counts of the apportionment populations of the states excluding the undocumented persons in the states are presented in Column 7 of Table 3.

I then apportioned the House using these adjusted 2020 state apportionment population numbers that were based on the 2019 Census Bureau estimates; these 2020 apportionment numbers do not include the undocumented immigrants in the states. The numbers of seats assigned to the states are shown in Column 8 of Table 3. Alabama ends up receiving seven seats in 2020, if the apportionment populations exclude undocumented persons, which is a gain of one over the six that the state will likely receive in the 2020 apportionment if undocumented persons are counted in the populations. My home state of Texas ends up receiving 38 seats in 2020 if undocumented persons are excluded from the 2020 counts, a loss of one seat from the 39 seats Texas is expected to receive if undocumented persons are included in the 2020 counts.

As noted, Alabama gains one seat if undocumented persons are excluded from the 2020 apportionment population. Two other states gain one more House seat if undocumented persons are excluded, namely, Minnesota and Ohio. And as noted, Texas will lose one seat if undocumented persons are excluded from the 2020 apportionment population counts; the other two states losing one seat are California and New Jersey.

The seat assignment results for the 50 states when undocumented persons are excluded from the apportionment populations that are shown in Column 8 of Table 3 are exactly the same as the seat assignments shown in Column 8 of Table 2, the table showing the allocation of seats based on the Census Bureau state population estimates for 2018. The seat assignments for the states produced with apportionment data excluding undocumented immigrants are the same using either the Census Bureau state estimates for 2018 or the Census Bureau state estimates for 2019.

Finally, I was interested in ascertaining for 2020 the numbers of persons per House seat in the states with and without undocumented persons in the apportionment populations. For each state I thus divided the 2020 apportionment population by the number of House seats assigned to the state. I did this twice, once using the data with undocumented persons in the counts, i.e., the data in Column 4 of Table 3, and next using the data with undocumented persons not in the counts,

i.e., the data in Column 7 of Table 3. These population per seat calculations are shown in Column 6 and Column 9 of Table 3.

For most of the states their population per seat calculations are larger when undocumented persons are included in the apportionment populations than when they are not included. The differences are large for some states and small for other states. Let us consider Alabama as an example. When undocumented persons are included in the 2020 counts, Alabama ends up with 823,450 persons per seat. When undocumented persons are excluded from the calculations, Alabama ends up with 697,385 persons per seat.

There are at least two ways to evaluate these population per seat data. One is to ascertain if the variance among the states becomes smaller when undocumented persons are excluded. Ideally one would prefer that the degree of dispersion across the states in the population per seat calculations be as small as possible. The smaller the variance the more similar the states' values to the mean value across the 50 states. I have thus calculated the standard deviation for the data measuring the population per house seat among the states; it is shown at the bottom of Column 6 of Table 3; its value is 84,705.9. This is an indication of the degree of dispersion among the states in the values of their seats per population.

Next, I calculated the standard deviation of the population per seat data for the states when undocumented persons have been removed from the apportionment

populations. The standard deviation of this distribution is 81,893.6 and is shown at the bottom of Column 9 of Table 3.

These two standard deviations inform us that the population per seat counts among the states are less dispersed, that is, there is less variance in the data, when undocumented persons are excluded from the apportionment populations than when they are included.

Another way to evaluate the population per seat counts would be to compare the counts for Alabama with another state. I will compare Alabama with Texas. When undocumented persons are included in the 2020 apportionment populations of the states, Alabama ends up with a population per seat value of 823,449.8, meaning that in Alabama in 2020 there will be over 823,000 persons for every one of its six House seats. Texas has a corresponding value of 758,121.9 meaning that in Texas in 2020 there will be over 758,000 persons for each of its 39 House seats. Comparing Alabama to Texas, there will be a difference of over 65,000 persons per House seat.

However, when one apportions the U.S. House of Representatives with apportionment data in which undocumented persons have been excluded, Alabama ends up with a population per seat value of 697,385.1, and Texas ends up with a value of 733,937.0. Comparing Alabama to Texas with these data, there is a difference of over 36,000 persons per House seat if the House apportionment is

based on data excluding undocumented persons. The population per House seat difference between Alabama and Texas is significantly smaller if 2020 data excluding undocumented persons are employed in the apportionment calculations.

I reserve the right to further supplement my report in light of additional facts, testimony and/or materials that may come to light.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the above information is true and correct to the best of my knowledge and belief.

Executed on January 28, 2020.

Dudley L. Poston, Jr.

DUDLEY L. POSTON, JR., Ph.D.

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TABLE 3. APPORTIONMENTS, 2010 & 2020

STATE	APPOR. POP. 2010	NUMBER OF APPORTIONED REPS. 2010 (SEATS)	APPOR. POP. BASED ON 2019 CB ESTIMATES	NUMBER OF APPORTIONED REPS. 2020 (SEATS)	POP. PER SEAT		APPOR. POP. BASED ON 2019 CB ESTIMATES EXCL. UNDOCS	NUMBER OF APPORTIONED REPS. 2020 (SEATS)	POP. PER SEAT
COL 1	**COL 2**	**COL 3**	**COL 4**	**COL 5**	**COL 6**		**COL 7**	**COL 8**	**COL 9**
Alabama	4,802,982	7	4,940,699	6	823,449.83		4,881,696	7	697,385.14
Alaska	721,523	1	745,399	1	745,399.00		738,060	1	738,060.00
Arizona	6,412,700	9	7,401,033	10	740,103.30		7,113,321	10	711,332.10
Arkansas	2,926,229	4	3,039,798	4	759,949.50		2,982,245	4	745,561.25
California	37,341,989	53	39,856,882	52	766,478.50		37,630,146	51	737,846.00
Colorado	5,044,930	7	5,858,009	8	732,251.13		5,659,456	8	707,432.00
Connecticut	3,581,628	5	3,571,803	5	714,360.60		3,447,052	5	689,410.40
Delaware	900,877	1	985,398	1	985,398.00		955,933	1	955,933.00
Florida	18,900,773	27	21,889,707	29	754,817.48		21,062,252	29	726,284.55
Georgia	9,727,566	14	10,764,719	14	768,908.50		10,357,331	14	739,809.36
Hawaii	1,366,862	2	1,428,872	2	714,436.00		1,381,945	2	690,972.50
Idaho	1,573,499	2	1,818,264	2	909,132.00		1,778,412	2	889,206.00
Illinois	12,864,380	18	12,687,372	17	746,316.00		12,282,438	17	722,496.35
Indiana	6,501,582	9	6,778,307	9	753,145.22		6,676,910	9	741,878.89
Iowa	3,053,787	4	3,174,857	4	793,714.25		3,121,016	4	780,254.00
Kansas	2,863,813	4	2,930,907	4	732,726.75		2,854,987	4	713,746.75
Kentucky	4,350,606	6	4,493,507	6	748,917.83		4,457,652	6	742,942.00
Louisiana	4,553,962	6	4,682,695	6	780,449.17		4,612,771	6	768,795.17
Maine	1,333,074	2	1,350,732	2	675,366.00		1,345,348	2	672,674.00
Maryland	5,789,929	8	6,093,102	8	761,637.75		5,819,686	8	727,460.75
Massachusetts	6,559,644	9	6,943,517	9	771,501.89		6,680,146	9	742,238.44
Michigan	9,911,626	14	10,026,556	13	771,273.54		9,926,573	13	763,582.54
Minnesota	5,314,879	8	5,688,633	7	812,661.86		5,592,125	8	699,015.63
Mississippi	2,978,240	4	2,988,071	4	747,017.75		2,967,232	4	741,808.00
Missouri	6,011,478	8	6,177,013	8	772,126.63		6,115,474	8	764,434.25
Montana	994,416	1	1,083,015	2	541,507.50		1,079,783	2	539,891.50
Nebraska	1,831,825	3	1,952,242	3	650,747.33		1,891,904	3	630,634.67
Nevada	2,709,432	4	3,132,569	4	783,142.25		2,910,883	4	727,720.75
New Hampshire	1,321,445	2	1,369,653	2	684,826.50		1,360,101	2	680,050.50
New Jersey	8,807,501	12	8,907,980	12	742,331.67		8,445,584	11	767,780.36
New Mexico	2,067,273	3	2,109,238	3	703,079.33		2,050,410	3	683,470.00
New York	19,421,055	27	19,504,989	26	750,191.88		18,804,359	26	723,244.58
North Carolina	9,565,781	13	10,627,483	14	759,105.93		10,299,071	14	735,647.93
North Dakota	675,905	1	775,788	1	775,788.00		770,384	1	770,384.00
Ohio	11,568,495	16	11,738,427	15	782,561.80		11,644,778	16	727,798.63
Oklahoma	3,764,882	5	3,994,121	5	798,824.20		3,906,565	5	781,313.00
Oregon	3,848,606	5	4,280,109	6	713,351.50		4,169,331	6	694,888.50
Pennsylvania	12,734,905	18	12,845,782	17	755,634.24		12,679,213	17	745,836.06
Rhode Island	1,055,247	2	1,062,808	1	1,062,808.00		1,033,125	1	1,033,125.00
South Carolina	4,645,975	7	5,229,963	7	747,137.57		5,141,447	7	734,492.43
South Dakota	819,761	1	898,566	1	898,566.00		892,319	1	892,319.00
Tennessee	6,375,431	9	6,914,508	9	768,278.67		6,776,851	9	752,983.44
Texas	25,268,418	36	29,566,755	39	758,121.92		27,889,604	38	733,936.95

TABLE 3. APPORTIONMENTS, 2010 & 2020

STATE	APPOR. POP. 2010	NUMBER OF APPORTIONED REPS. 2010 (SEATS)	APPOR. POP. BASED ON 2019 CB ESTIMATES	NUMBER OF APPORTIONED REPS. 2020 (SEATS)	POP. PER SEAT		APPOR. POP. BASED ON 2019 CB ESTIMATES EXCL. UNDOCS	NUMBER OF APPORTIONED REPS. 2020 (SEATS)	POP. PER SEAT	
COL 1	**COL 2**	**COL 3**	**COL 4**	**COL 5**	**COL 6**		**COL 7**	**COL 8**	**COL 9**	
Utah	2,770,765	4	3,263,160	4	815,790.00		3,158,997	4	789,749.25	
Vermont	630,337	1	628,343	1	628,343.00		627,719	1	627,719.00	
Virginia	8,037,736	11	8,634,164	11	784,924.00		8,341,937	11	758,357.91	
Washington	6,753,369	10	7,746,750	10	774,675.00		7,492,194	10	749,219.40	
West Virginia	1,859,815	3	1,791,934	2	895,967.00		1,788,363	2	894,181.50	
Wisconsin	5,698,230	8	5,849,003	8	731,125.38		5,773,115	8	721,639.38	
Wyoming	568,300	1	585,214	1	585,214.00		578,249	1	578,249.00	
		435		435	**84,705.93**	**is s.d.**		435	**81,893.57**	**is s.d.**

EXHIBIT F

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ALABAMA SOUTHERN DIVISION

STATE OF ALABAMA, and MORRIS J. BROOKS, JR., Representative for Alabama's 5th Congressional District,

*Plaintiff*s,

v.

UNITED STATES DEPARTMENT OF COMMERCE, et al.

Defendants,

And

DIANA MARTINEZ, et al.,

Defendant-Intervenors,

COUNTY OF SANTA CLARA, CALIFORNIA, et al,

Defendant-Intervenors,

And

STATE OF NEW YORK, et al.,

Defendant-Intervenors.

Civil Action No. 2:18-cv-00772-RDP

SWORN DECLARATION AND REBUTTAL EXPERT REPORT OF DUDLEY L. POSTON, JR., Ph.D.

My name is Dudley L. Poston, Jr. I have previously submitted an expert report ("Poston Report") and a supplemental expert report ("Poston Supplemental Report") in this case.

I. INTRODUCTION

I have reviewed the expert reports of Dr. Enrique Lamas, Dr. Sunshine Hillygus, Mr. Kimball William Brace, and Dr. Douglas Massey, all of whom criticize my reports in one way or another. Having reviewed their criticisms of my reports, as set out below, and having extended my empirical investigations of the 2020 apportionment of the U.S. House of Representatives, also as set out below, I continue to believe that the conclusions I previously reached in my report and supplemental report are correct and reasonable. My Opinions remain:

> Opinion Number One: If undocumented persons are included in the 2020 United States Census apportionment population, the State of Alabama is substantially likely to be allotted only six seats in the United States House of Representatives.
>
> Opinion Number Two: Conversely, if undocumented persons are excluded from the 2020 United States Census apportionment population, the State of Alabama is substantially likely to be allotted seven seats in the United States House of Representatives.
>
> Opinion Number Three: Including undocumented persons in the 2020 United States Census apportionment population is likely to cause greater disparities in the number of lawful inhabitants per Congressional district than if undocumented persons are excluded from the apportionment population.

Poston Report, at 3.

The overarching criticism leveled against my Report and Supplemental Report is that determining the exact count of the 2020 Census is impossible. But that an "exact" number of residents cannot be determined does not mean that a reasonable effort to count every resident is futile, or that one cannot calculate with a reasonable degree of accuracy the size of a future population. Even the "actual enumeration" provided by the Census Bureau for April 1, 2020 will never match the actual (i.e., true) population of the United States on April 1, 2020, given the various adjustments that will be made to the 2020 enumeration. But that does not mean that doing so is not worthwhile. I'm simply pointing out that exactitude in a Census count is impossible. The same can be said for projections, estimates, and other demographic products.

Having said that, I stand by my calculations and conclusions. Using accepted demographic methods and what I deemed to be the best available data, I first developed population projections of the resident populations of the states of the U.S. for April 1, 2020. Based on these projected numbers for the states, I then used the method of Equal Proportions to determine the numbers of representatives that each state would receive in the 2020 apportionment of the U.S. House. I do not deny that the experts raised *some* valid criticisms of my methods set out in my reports. But these criticisms were largely either hypertechnical or in response to unavoidable issues. For example, while an actual enumeration of undocumented immigrants

would obviously be preferable to projected counts based on estimates, no such enumeration exists. Demography as a discipline does not only rely on actual enumerations to draw conclusions. The bottom-line is that *none* of the experts identified any mathematical errors in my calculations, and none of them provided any calculations that would contradict my results. Specifically, no expert stated—irrespective of whether undocumented immigrants are included or excluded from the 2020 Census—that (a) Alabama would retain its current 7 representatives after the 2020 Census, or that (b) Alabama would only be allocated 6 representatives after the 2020 Census. I will now turn to my detailed responses to each expert's criticisms of my findings.

II. RESPONSES TO SPECIFIC EXPERT REPORTS

1. Dr. Enrique Lamas

Dr. Lamas is a long-time employee of the U.S. Census Bureau, working there since the 1980s. I have personally met him several times, mainly during the six-year period from 2005 to 2011 when I was a Member of the U.S. Census Bureau Scientific Advisory Committee on which I represented the Population Association of America.[1]

[1] Our committee would meet twice a year for two days at the Census Bureau headquarters in Suitland, Maryland. We would discuss a host of issues with Census Bureau officials. Dr. Lamas was present at many of the meetings.

Dr. Lamas essentially reached two main conclusions in his report, which he then used as premises to opine that it is futile to project the 2020 apportionment population. Dr. Lamas's first conclusion is that an estimate is not the same as the true count because the apportionment formula is overly sensitive to small changes in population, and that Census Bureau estimates for a particular year do not perfectly provide the actual or true numbers for that year. Dr. Lamas's second conclusion is that we can never know the true size of the undocumented population without an enumeration.[2] On the basis of these two conclusions, Dr. Lamas then argues that attempts to project counts of the 2020 apportionment population, either with or without the undocumented populations, are futile. While I agree with Dr. Lamas's premises, I disagree with his argument that it is futile to project counts of the 2020 apportionment population. Indeed, the Census Bureau itself regularly produces estimates of the United States population, belying an argument that anything other than a true count of the population is not worthwhile.

A quote from Dr. Lamas captures his claim that at this point in time one really can't even project an apportionment for 2020. He writes that: "In short, the population counts that will become available after the Census Bureau finishes enumerating the population are sufficiently unknowable at this time, such that the

[2] This is a point also made by Dr. Hillygus. *See infra* Section II.2.

ultimate result of the apportionment process cannot be predicted accurately at this point . . . .” Lamas Report, at 4.

Dr. Lamas is claiming that since we don’t have the true enumeration counts for 2020, we can never know exactly what the actual apportionment will be. Although we cannot know the *exact* outcome of an event that has not yet happened, we can still project that outcome with reasonable accuracy, as I will show below.

While it is true that we don’t yet have in our possession the true counts of the population that will result from the 2020 Census, we can still use demographic methods of estimation and projection to establish reliable patterns. Indeed, attempts by Election Data Services (EDS) at predicting the apportionment results of periods before 2020, say in 2010, were pretty consistent with the actual results that followed those predictions.[3] I refer here to an analysis published by EDS on December 23, 2009 using Census Bureau estimates for 2009 and a one-year interval to project the apportionment population for 2010. *See* ELECTION DATA SERVS., NEW POPULATION ESTIMATES SHOW ADDITIONAL CHANGES FOR 2009 CONGRESSIONAL APPORTIONMENT, WITH MANY STATES SITTING CLOSE TO THE EDGE FOR 2010 (2009), https://www.electiondataservices.com/wp-content/uploads/2014/12/NR_Appor09w

[3] Overseas population numbers were not used in the EDS analysis. ELECTION DATA SERVS., MONTANA GAINS CALIFORNIA’S SEAT WITH NEW 2019 CENSUS ESTIMATES; BUT ALABAMA & OHIO TO ALSO LOSE BY 2020 CENSUS ESTIMATES, at 6 (2019), https://www.electiondataservices.com/wp-content/uploads/2019/12/NR_Appor19wTablesMaps.pdf. (“No estimates were provided for U.S. military personnel overseas.”)

TablesMap.pdf. Of the 385 seats apportioned in the 2010 Census, the 2010 EDS apportionment projection was off for only four seats, and all four of those were close calls.[4] The four seats in question all fell right before or right after the allocation of the 435th seat. *See* U.S. CENSUS BUREAU, PRIORITY VALUES FOR 2010 CENSUS (2010), http://www2.census.gov/programs-surveys/decennial/2010/data/apportionment/PriorityValues2010.xls?#.

The point I am making is that we can indeed use projected counts of the apportionment data for the states to get a reasonable idea of what the apportionment will look like. The apportionment results may not be perfect, but that does not mean they lack merit.

Let's return to my 2020 apportionment analysis, in which I projected the 2020 resident population numbers using as a basis the 2019 Census Bureau population estimates. *See generally* Poston Supplemental Report. The major point made in this apportionment exercise was that Alabama would receive 6 seats. *Id.* EDS also conducted nine 2020 apportionment projections and each of those projections

[4] EDS projected that Florida would receive 26 seats, but it received 27; Minnesota would receive 7 seats, but it received 8; Missouri would receive 9 seats, but it received 8; and that New York would receive 28 seats, but it received 27. *Compare* ELECTION DATA SERVS., NEW POPULATION ESTIMATES SHOW ADDITIONAL CHANGES FOR 2009 CONGRESSIONAL APPORTIONMENT, WITH MANY STATES SITTING CLOSE TO THE EDGE FOR 2010 (2009), https://www.electiondataservices.com/wp-content/uploads/2014/12/NR_Appor09wTablesMap.pdf, *with* U.S. CENSUS BUREAU, TABLE 1. APPORTIONMENT POPULATION AND NUMBER OF REPRESENTATIVES, BY STATE: 2010 CENSUS (2010), http://www2.census.gov/programs-surveys/decennial/2010/data/apportionment/ApportionmentPopulation2010.xls?#

reached the same conclusion that I did, that Alabama would not retain its 7th seat. *Compare id.*, *with* ELECTION DATA SERVS., MONTANA GAINS CALIFORNIA'S SEAT WITH NEW 2019 CENSUS ESTIMATES; BUT ALABAMA & OHIO TO ALSO LOSE BY 2020 CENSUS ESTIMATES (2019), https://www.electiondataservices.com/wp-content/uploads/2019/12/NR_Appor19wTablesMaps.pdf. Thus, there is consistency between the results of my 2020 apportionment analysis and all nine of the apportionment analyses undertaken by EDS with respect to Alabama. Alabama is projected to receive only 6 seats and not retain its 7th seat.

The projected apportionment conducted for 2010 by EDS was only off for four seats, allocating seats to two states that they did not actually receive, and not allocating seats to two states that they actually did receive. *See supra* note 4. Those results were hardly futile. Yes, apportionment calculations based on estimates and projections may not be perfect, but they are surely worthwhile.

One other point made by Dr. Lamas dealt with the overseas population.[5] Dr. Lamas correctly noted that my analysis did not "consider an important change the Census Bureau has made to how it will allocate the Federally-affiliated overseas population back to their home states for apportionment purposes. The exact effect of this rule on the apportionment process is unknown at this time." Lamas Report, at 4.

[5] Dr. Hillygus and Mr. Brace make this point as well. *See infra* Section II.2–3.

Dr. Lamas writes further of the Federally Affiliated Overseas ("FAO" or "overseas" for short) population:

> The Census Bureau included the FAO population and their dependents in the apportionment counts in the 1970, 1990, 2000, and 2010 censuses and plans to do so again in 2020. However, for 2020 the method of allocating that population across the states has changed. Specifically, in a final Rule published on February 8, 2018, in the Federal Register, the Census Bureau stated that it would count military personnel that are temporarily deployed overseas at the locations or bases from which they deployed—not, as the Census Bureau had previously done, at their stated permanent residence.

Lamas Report, at 11.

However, Dr. Lamas (as well as Dr. Hillygus and Mr. Brace, *see* discussion *infra* at Sections II.2–3.) declines to engage in or discuss the finer details of how much the new rule will impact the actual *apportionment*. "The enumerated resident population from the 2010 Census is the starting point for all post-2010 population estimates." CENSUS BUREAU, METHODOLOGY FOR THE UNITED STATES POPULATION ESTIMATES: VINTAGE 2019, at 2 (2020), https://www2.census.gov/programs-surveys/popest/technical-documentation/methodology/2010-2019/natstcopr-methv2.pdf. The Census's detailed methodology does not reflect any changes in the estimates to include deployed military personnel as part of the resident population pursuant to the upcoming rule change. By contrast, the data on the overseas population that I used *do* include deployed military personnel as part of the overseas

population, because that's how they were counted in 2010. As such, my 2020 projected apportionment populations neither exclude nor overcount deployed military personnel as a result of the Census's rule change, because this rule change does not affect the available data. Although they may be allocated to a different component of the apportionment population in 2020, my projections include them as part of the apportionment population.

While the rule change could have some effect on a state's apportionment population, we unfortunately do not yet have access to state-level data using the revised definition of the overseas population. If we did, I could have used the updated definition of this population in developing the projections of the 2020 apportionment population. Lacking the revised data, the 2010 overseas population data are the best data available, and those are the data that I used.

Despite the reservations of Dr. Lamas, in responding to the various expert reports I recalculated my basic projections of the 2020 resident populations of the states using the single year trend line from 2018 to 2019. Using these newly developed apportionment data to apportion the House, Alabama still only receives 6 seats. *See infra* Section III.

Dr. Lamas also points out that we can never know the true size of the undocumented population. He writes:

> Dr. Poston's secondary conclusion—that Alabama would maintain a seat if the apportionment methodology were

> changed to exclude undocumented immigrants—suffers from a separate serious deficiency: namely, the lack of accurate state estimates of the resident undocumented population. Indeed, in my opinion this deficiency is the most glaring shortcoming of Dr. Poston's report because of the magnitude of variability of the estimates.

Lamas Report, at 13. Dr. Lamas notes that the Office of Immigration Statistics (OIS) at the Department of Homeland Security produces estimates of the undocumented population, and so does the Pew Research Center, and so does the Center for Migration Studies (CMS). *Id.* He correctly notes that they all use the residual method. *Id.*

Here is a short summary of how the residual method works. The residual method is straightforward. First, the researchers use U.S. census data and counts from government surveys, such as the American Community Survey (ACS) and the Current Population Survey (CPS), to figure out how many immigrants there are living in the U.S. in a certain year. Next, the researchers gather official data on the counts of immigrant admission, along with other kinds of demographic data (e.g., death rates) and characteristics of the immigrants (Medicare, Medicaid, SSI, SNAP, and TANF participation; year of entry into the U.S.; etc.) to figure out how many of these immigrants are living in the U.S. legally. If an immigrant has one or more of these characteristics (e.g., receives Social Security or Medicare), then this makes it unlikely the immigrant is here illegally. The goal is to use various data items to get an estimate of the number of legal immigrants. The legal immigrants are then

subtracted from the total number of immigrants to get an estimate of the numbers of undocumented immigrants. The difference (i.e., the residual) is the estimated number of undocumented persons.

Dr. Lamas correctly notes that there is variability in the overall numbers (as does Dr. Massey in his expert report, *see infra* Section II.4). Lamas Report, at 13–16. Dr. Lamas reports a Pew total number of 10.7 million for 2016. Lamas Report, at 14. He also reports an OIS number for 2015 and a CMS number for 2016. *Id*. The Pew number is the smallest, 10.7 million, and the CMS number for 2016 is just slightly higher at 10.79 million. He reports a higher OIS number of 11.96 million, but this is a calculation for the year 2015. *Id*.

In my January 2020 reports, I used the Pew numbers for 2016 as they were the most conservative of the three sets of numbers (i.e., the lowest of them all)[6] and widely well-regarded. And I showed that if we projected the Pew numbers from 2016 to 2020, subtracted them from the resident population counts for the states, added in the overseas populations, and then apportioned the House, Alabama would retain its 7th seat. Poston Report, at 17 & Table 2; Poston Supplemental Report at 4–6 & Table 3.

[6] If Alabama loses a seat using the most conservative estimates of the size of the undocumented population, then it stands to reason that the same would hold true using larger estimates as the base.

One can't argue with the statement of Dr. Lamas that we don't have a true count (i.e., an enumeration) of the undocumented population. We only have estimates, based on a residual method. To get a true count, we would need a question on the census asking respondents who were born in a foreign country and now residing in the U.S. about the status of their residency.[7] However, absent a true count, estimates are the only way to provide a statement about the size of the population. The question is whether a reasonably accurate estimate can be made.[8]

Since we don't have a decennial census enumeration or an ACS estimate of the immigrant population according to their legal/illegal status, we must rely on other estimates. I used the Pew data for the reasons discussed above. However, since one or more of the experts have criticized my use of those data, I undertook a re-analysis using other available data to check to see if Alabama would still retain its 7th seat using other reputable data as a source for the projections. Using 2018 data and also using 2017 data of state-level estimates of the undocumented population from different sources to calculate apportionment data and seat assignments for 2020, I show in five different apportionment exercises that Alabama always retains

[7] One could also include the same question on the American Community Survey (ACS) to obtain an estimate from those data, but that would also not be an enumeration.

[8] We will not have a 100% enumeration of the undocumented population in the 2020 census. The earliest we could have a 100% enumeration would be the 2030 census. However, the Census Bureau could add the above question about legal status, or a similar question, in the American Community Survey, say in 2021. The ACS is an annual survey sent each year to about 3.5 million of the approximately 129 million households in the U.S., or around 1 in 36 or 37 U.S. households.

7 seats when the estimates of the undocumented population are removed prior to executing the apportionment (see my detailed statement below in Section III of this report).

2. Dr. Sunshine Hillygus

Dr. Sunshine Hillygus is a Professor of Political Science and Public Policy at Duke University. Dr. Hillygus writes in several places in her report that I am not sufficiently cognizant in my report of the "uncertainty" in my analyses, and that indeed "Dr. Poston ignores the uncertainty in his estimates." Hillygus Report, at 8.

I strongly disagree. With every set of estimates I used for either 2018 or 2019, and for the 2020 projected data that I developed, I always clearly stated the assumptions behind the counts I was using. For instance, when I used the 2018 Census Bureau estimates of the populations of the states, I wrote the following: "My assumptions are (1) that the Census Bureau's estimates of the states' 2018 populations are their true counts in 2018, and (2) that the states will grow or decline in size between 2018 and 2020 at the same annual rates as their changes between 2010 and 2018." Poston Report, at 14.

It is simply not true for her to write that I have ignored the uncertainty of the estimates and counts. I wish Dr. Hillygus had read some of my published work before claiming that my estimates and projections ignore the issue of uncertainty. This is exactly the opposite of what I have written previously over my almost 50-

year career as a demographer. As examples, I will mention three of my observations regarding population projections that clearly state that population projections are not observations about the certain size of the populations at some future time, but are based on the assumptions underlying the analyses.

These three example observations are published in my demography textbook (coauthored with the now deceased Leon Bouvier who died in 2011). *See* POPULATION AND SOCIETY: AN INTRODUCTION TO DEMOGRAPHY (2d ed. 2017). I wrote on page 343 that a population projection (much like my projections of the 2020 apportionment populations of the states) "refers to the number of people who will comprise the population of an area at some future point in time according to clearly stated demographic assumptions." I wrote on pages 343–44 that the assumptions behind the projections "reflect what appears to be reasonable at a given point in time." And "looking for quick and easy answers, analysts not well versed in demographic research too often ignore the assumptions and only emphasize the projections."[9] I further wrote on page 416 that population projections are what the population will look like according to stated assumptions and that "[i]n no way should they be seen as predictions, nor should they be considered the final word."

[9] Regrettably, this appears to be exactly what Dr. Hillygus has done in her review of my expert reports. She does not seem to be that well-versed in demographic research and hence ignores the stated assumptions and only emphasizes the counts reflected in the projections.

Dr. Hillygus also criticizes as unrealistic my assumption that the state's population will grow or decline in population at the same average annual rate between 2018 (or 2019 in the supplemental report) and 2020 as it did between 2010 to 2018 (or 2019). Hillygus Report, at 9. The basis for this decision on my part to use a long-term interval was the evidence produced in nine different reports of Election Data Services (EDS) that were published in 2019. I noted in my report the following:

> EDS decided to use nine different trends to project the 2019 data to 2020; several were based on short trends, i.e., from 2018 to 2019, from 2017 to 2019, and from 2016 to 2019; several were based on mid-length trends, i.e., from 2015 to 2019, from 2014 to 2019, and from 2013 to 2019; and several were based on long trends, i.e., from 2012 to 2019, from 2011 to 2019, and from 2010 to 2019.

Poston Report, at 21. I noted further that:

> [A]lthough all nine of the EDS trend methods produced slightly different state population projections for 2020, all nine trend methods resulted in exactly the same apportionment results for all 50 states. Moreover, these apportionment results produced by the EDS are exactly the same as my apportionment results presented and discussed in earlier pages of this report and displayed in Table 2 of my report.

Id.

And as noted above and as will be shown below, in response to the criticisms my reports have received, I recalculated my basic projection of the 2020 resident populations of the states using the single-year trend line from 2018 to 2019. I

assumed that the Census Bureau's estimates of the states' 2019 populations are their true counts in 2019, and that the states will grow or decline in size between 2019 and 2020 at the same annual rates as their changes between 2018 and 2019. When I used these apportionment data to allocate House seats to the states, Alabama still received only 6 seats, just as my earlier work, and just as all the EDS work, has shown.

Dr. Hillygus also criticizes my use of the Pew Research Foundation's 2016 state-level estimates of the size of their undocumented populations[10] and the Pew methodology in general. *See* Hillygus Report, at 12–25. Given that the estimated numbers of the undocumented population have declined since 2016, she argues that more recent estimates of the undocumented numbers need to be employed. *See* Hillygus Report, at 12.

In that case, as I will show below in Section III of this report, when I use 2017 or 2018 estimates of the undocumented population counts of the states, remove them from the apportionment populations, and then reapportion the House in five different exercises, Alabama still retains 7 seats in each of the five exercises. These results

[10] Dr. Hillygus is very critical in general of the undocumented immigration count estimates produced by Pew researchers. Although I do not agree with her criticisms of the Pew researchers and their data, when I use 2018 undocumented count estimates from the Center for Migration Studies as another data source of the undocumented population, Alabama still retains 7 seats. *See infra* Section III.

are exactly the same as the result I reached using the 2016 Pew data. *See infra* Section III.

Finally, Dr. Hillygus states that it is not possible to engage in a demographic analysis dealing with the undocumented population: "There is currently no feasible way to reliably exclude undocumented immigrants from the 2020 apportionment count." Hillygus Report, at 3; *see also id.* at 27–46.

I disagree with this assessment. While it is true that there is variability in the estimates of the counts of undocumented immigrants, it is not impossible to develop 2020 apportionment counts excluding undocumented immigrants. In Section III below, I will describe my work using several different sets of estimates of the undocumented population and will examine the apportionment outcomes.

3. Mr. Kimball William Brace

Mr. Brace is the President of Election Data Services (EDS), a Manassas, Virginia-based consulting firm whose specialty is reapportionment, redistricting matters, election administration issues, and the census. I do not know Mr. Brace and I do not believe I have ever met him.

With but a few exceptions, the criticisms of Mr. Brace are similar to those of the other three experts. He criticizes me for using a 2010–2019 trend line because of the possibility that other trend lines, especially shorter ones, might result in differences in the apportionment calculations. Mr. Brace fails to mention that the

nine different analyses conducted by his EDS organization using nine different trend lines all produced exactly the same assignments of the 435 seats among the 50 states. But, as noted above, and as will be shown below in Section III, in response to this criticism, I used the 2018–2019 trend line to project the 2019 resident data for the states to 2020, and then apportioned the House using population data including all residents (legal and illegal). Alabama continues to receive only 6 seats.

Mr. Brace criticizes my not taking into account the end date of April 1, 2020 for the projection period from July 1, 2019, the date of the Census Bureau 2019 estimates. Rather than projecting the 2019 data forward for one year to 2020, he writes that I should have projected them forward not for one year but for 3/4th of one year. The EDS apportionments used an end date of April 1, 2010, whereas my apportionment calculations used an end date of July 1, 2020. My previous apportionment results were exactly the same as all nine of the EDS reports. It made no difference in the apportionment results whether an end date of April 1, 2020 was used or an end date of July 1, 2020 was used. However, as I show below, when I recalculated my basic projections of the 2020 resident populations of the states, using an end date of April 1, 2020, and then apportioned the House, Alabama still receives only 6 seats.

Mr. Brace criticized my use of the 2010 overseas population data as a basis for 2020 because of the changes in their definitions. But as noted above, since we

don't have access to any overseas population data other than those for 2010, there are no other options available.

Mr. Brace also takes issue with my calculations of the average population per seat size for the 50 states. He correctly notes that some states only receive the one automatic seat. But I take issue with his argument against my method; if a small state such as Wyoming had a sufficiently large population, the Method of Equal Proportions would end up assigning Wyoming an additional seat. Nevertheless, I will address this issue of Mr. Brace in Section III below by examining the issue of variability in the values of population per seat in two ways, namely, among all fifty states as I did in my earlier reports, and among only those states with more than the one automatically assigned House seat.

Mr. Brace also criticizes my use of the Pew estimates of the undocumented population. I addressed this criticism by additionally using 2018 data estimates of the undocumented populations of the states that were produced by the Center for Migration Studies. I used these data as the basis for generating 2020 counts of the undocumented population. I then subtracted them from the 2020 apportion counts and reapportioned the House. Alabama retains 7 seats in the apportionment.

4. Dr. Douglas Massey

Dr. Massey is currently the Henry G. Bryant Professor of Sociology and Public Affairs at Princeton University where he also directs the Office of Population

Research. He has previously served on the faculties of the University of Chicago and the University of Pennsylvania.[11]

Dr. Massey's Expert Report focuses almost exclusively on issues dealing with international migrants, particularly the undocumented immigrant population. He notes in his report, as I note above, that we do not have an enumeration of the immigrant population by legal status. In his report he lays out in detail and in a most exemplary manner the indirect methods that demographers use to estimate the size and characteristics of the undocumented population; the basic method is known as the residual method, that I mentioned above in this Report.

A most important point made in Dr. Massey's report is the following: "Although we cannot know with certainty the true size and composition of the undocumented population at any level, including nationally, if the same methods and assumptions are consistently applied to the same data sources over time, trends in the size and composition of the undocumented population emerge." Massey Report, at 5.

Dr. Massey's point, in my opinion, argues in favor of our using different sets of estimates of the undocumented population to get an idea of the effect of undertaking apportionment calculations after subtracting out projected counts of the

[11] I have been a friend of Dr. Massey's since the late 1970s when he received his Ph.D. degree from Princeton. I usually see him once or twice a year at meetings of professional associations.

undocumented population based on the estimates. Dr. Massey notes that although there is variability in the estimates of the undocumented population produced by the different organizations, the variability is not extremely large. Massey Report, at 5.

I respond below to Dr. Massey's point about the variability in the size estimates of the undocumented population by undertaking five different apportionment calculations, each using different sets of undocumented population estimates. In every exercise, Alabama retains 7 seats in the House.

III. MY RESEARCH ADDRESSING MANY OF THE CRITICISMS OF THE EXPERT REPORTS

Having responded above to the various critiques written by the four experts in their reports, I now discuss in detail the work I have just recently performed in March of 2020 addressing the criticisms. I have mentioned this work in the previous section, but not with the detail that I will present here.

To respond in detail to the criticisms of my earlier work as outlined in the four expert reports, I did the following:

1. I recalculated my basic projections of the 2020 resident populations of the states using the single-year trend line from 2018 to 2019, and an end date for the 2020 projections of April 1, 2020. Regarding the overseas population component, I estimated this component in the same way as in my earlier analyses, since we don't have access to the new data on the

overseas population. These calculations result in a new projection of the 2020 apportionment populations of the states. I then reapportioned the House. In my earlier work addressing this issue, I showed that Alabama will receive 6 House seats in 2020 if undocumented immigrants remained in the apportionment count.

Using the new single year trend line from 2018 to 2019, and an end date for the 2020 projections of April 1, 2020, the major finding is that Alabama is still shown to be assigned 6 seats. See further discussion below.

2. I obtained new data estimates[12] of the undocumented populations of the states and projected their numbers ahead to 2020. I then reapportioned the

[12] There is yet another source of data on undocumented immigrants in the U.S. that was mentioned by two of the four experts in their reports (*see* Brace Report, at 15; Hillygus Report, at 13), in each case for the purpose of showing a large disparity in estimates of undocumented immigrants and therefore to cast doubt on my methodology and conclusions. I am referring to estimates of the numbers of undocumented immigrants in the U.S., namely the so-called "Yale numbers," that were presented in an article by Fazel-Zarandi et al., and published in *Plos One* in September 2018. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0201193.

In that article the Yale researchers analyzed data for the years of 1990 to 2016 and developed a mean estimate of undocumented immigrants in the U.S. of 22.1 million, a value almost double that of virtually all other such estimates (hence its use by Mr. Brace and Dr. Hillygus). However, the Yale research has been judged to be deeply flawed and has been dismissed as unreliable by demographers on both ends of the political spectrum. See Noah Lanard, *A Study Says the Undocumented Population May Be Twice as Big as We Thought. Be Skeptical.*, MOTHER EARTH (Oct. 9, 2018), https://www.motherjones.com/politics/2018/10/a-study-says-the-undocumented-population-may-be-twice-as-big-as-we-thought-be-skeptical/, for more discussion of the study and its lack of credibility among demographers.

The experts who did mention the Yale report numbers made no attempt to qualify that usage or to acknowledge that the Yale study has been widely criticized as deeply flawed. Given Dr. Hillygus's

House using these new data by withdrawing the undocumented population numbers from the apportionment populations of the states. In my earlier work I used Pew undocumented data estimates for 2016 and showed that Alabama would retain 7 seats after removing the undocumented population counts from the apportionment populations of the states, and then reapportioning the House. Responding to criticisms that I should have used other estimates of the undocumented populations, I addressed the issue of reapportioning the House after withdrawing estimates of the undocumented populations from the apportionment populations of the states in five ways, as follows:

2a. I used undocumented immigrant data based on 2018 estimates developed by Robert Warren of the Center for Migration Studies.

2b. I used undocumented immigrant data based on 2017 estimates developed by Passel and Cohn of the Pew Foundation.

2c. I used the "high" end of the undocumented immigrant data based on 2017 estimates developed by Passel and Cohn of the Pew Foundation, based on 90% confidence intervals.

excoriation of the Pew methodology and numbers, her use of the Yale numbers without such qualification or acknowledgement is disingenuous.

2d. I used the "low" end of the undocumented immigrant data based on 2017 estimates developed by Passel and Cohn of the Pew Foundation, based on 90% confidence intervals.

2e. And I used the "high" end value for Alabama and the "low" end values for the other 49 states of the undocumented immigrant data based on 2017 estimates developed by Passel and Cohn of the Pew Foundation, based on 90% confidence intervals.

In each case the major finding is that Alabama will retain 7 seats if undocumented immigrants are removed from the population count.

3. I recalculated the numbers of persons per House seat in the states with and without undocumented persons in the apportionment populations and also reperformed my dispersion analyses using only the 43 states that are projected to receive more than one congressional district after reapportionment. The major finding is that regardless of which input I used, there is less variability between district sizes when undocumented persons are excluded from the apportionment populations than when they are included.

In the pages that follow, I now detail all of the above-stated work.

1. Projections and Apportionment calculations of the 2020 apportionment populations.

Here is how I developed the basic apportionment population projections for 2020 for the 50 states. I first took the estimated resident populations of the states for July 1, 2019 as produced by the U.S. Census Bureau and subtracted from these 2019 estimates the July 1, 2018 estimated counts of their resident populations. I then took three-fourths of the differences, and added them to the 2019 population estimates, to yield April 1, 2020 projected counts of the resident populations of the states.

My assumptions are (1) that the Census Bureau's estimates of the states' 2018 and 2019 populations are their true counts in 2018 and 2019, and (2) that the states will grow or decline in size between July 1, 2019 and April 1, 2020 at the same rates as their changes between 2018 and 2019.

Here are the resulting calculations for Alabama. The estimated counts of its resident population are 4,903,185 in 2019 and 4,887,871 in 2018. Subtracting the latter from the former equals 15,314; multiplying this difference by 0.75 equals 11,486, which added to the 2019 estimate of 4,903,185 equals 4,914,671, which is the projection of Alabama's resident population on April 1, 2020.

Next, to determine the projected counts of the 2020 overseas populations of the states, I calculated the proportion of each state's 2010 resident population compared to the number of overseas persons in 2010. I then multiplied these 2010 overseas proportions by the 2020 resident population projections of the states. I

added these estimates of the 2020 overseas population counts to the 2020 resident populations to produce the projections of the 2020 apportionment populations. My assumption here is that the proportions of the overseas populations to the resident populations of the 50 states in 2020 will be the same as the proportions were in 2010.

Here are the calculations for Alabama. In 2010 Alabama had an overseas population of 23,246, which is 0.0048634 of Alabama's 2010 resident population. I multiplied this proportion by Alabama's 2020 resident population of 4,914,671, equaling 23,902, which I then added to Alabama's 2020 resident population for a total apportionment population of 4,938,573.

I then used these projected apportionment population counts for 2020 to apportion the House for 2020, using the Method of Equal Proportions, thus providing for each of the 50 states its expected number of seats in the House in 2020.

I showed that Alabama receives only 6 seats in 2020.

Moreover, the seat assignments for all 50 states are exactly the same as the seat assignments I reported in my Supplemental Report. Also, the apportionment results produced in all nine of the apportionments undertaken by the EDS (in which each apportionment used a different interval to project the change in state population size between 2019 and 2020) are exactly the same as my apportionment results presented here, and are the same as in my earlier set of apportionment results presented and discussed in my Supplemental Report.

My results, and the EDS results, all showed that ten states would lose House seats in 2020, namely, Alabama -1 (from 7 to 6), California -1 (from 53 to 52), Illinois -1 (from 18 to 17), Michigan -1 (from 14 to 13), Minnesota -1 (from 8 to 7), New York -1 (from 27 to 26), Ohio -1 (from 16 to 15), Pennsylvania -1 (from 18 to 17), Rhode Island -1 (from 2 to 1), and West Virginia -1 (from 3 to 2).

My results, and the EDS results, all showed that seven states would gain House seats in 2020, namely, Texas +3 (from 36 to 39), Florida +2 (from 27 to 29), Arizona +1 (from 9 to 10), Colorado +1 (from 7 to 8), Montana +1 (from 1 to 2), North Carolina +1 (from 13 to 14), and Oregon +1 (from 5 to 6).

2. Projections and Apportionment calculations after removing the undocumented count estimates from the 2020 apportionment populations.

I next developed population projections for 2020 for the populations of the 50 states after excluding the undocumented immigrants estimated to be residing in the states in 2020. I performed this on March 24, 2020 using two different sets of estimated data of the undocumented population, 2a and 2b above. And I performed this on March 25th using three different sets of estimated data of the undocumented populations, 2c, 2d, and 2e. I now discuss each of the five tasks, one at a time.

2a. Using the Warren 2018 estimates of the counts of undocumented immigrants.

In the first of the five models excluding undocumented immigrants from the apportionment populations, I first estimated the number of undocumented immigrants residing in the states in 2020. I obtained data produced by the

demographer Robert Warren of the Center for Migration Studies, that were published in the *Journal on Migration and Human Security* on February 26, 2020 and available online at: https://journals.sagepub.com/doi/pdf/10.1177/2331502420906125.

I then divided these 2018 undocumented estimates by the 2018 Census Bureau estimates of their resident populations, to obtain estimates of the proportion of undocumented immigrants in the states. I then multiplied the proportions of undocumented immigrants in each state in 2018 by the states' projected 2020 resident populations and subtracted the resulting numbers from their 2020 resident populations. I then added in my estimates of the state's overseas population, as discussed above. My major assumption is that the proportions of undocumented immigrants in the states in 2018 will be the same proportions in 2020.

Here are the calculations for Alabama. Warren estimates that in 2018 Alabama had 56,000 undocumented immigrants residing in the state, which is 0.011457 of Alabama's 2018 resident population (for comparison, the Pew number of undocumented persons for 2016 for Alabama is 58,360 (2016 resident population of 4,863,300 multiplied by 0.012 (Pew's 2016 proportion))).

I multiplied the 2018 proportion by Alabama's 2020 resident population of 4,914,671 equaling 56,307. I subtracted this figure from Alabama's 2020 resident population to equal 4,858,363. To this number I then added in my estimate of the

2020 overseas population as discussed above, to equal a final apportionment population number (excluding undocumented persons) for Alabama of 4,881,992.

I next used the Method of Equal Proportions to apportion the House using these adjusted 2020 state apportionment population numbers that do not include the estimates of undocumented immigrants (using the Warren undocumented numbers for 2018 as the base).

Alabama ends up retaining 7 seats in 2020, if the apportionment populations exclude undocumented persons estimated on the basis of the undocumented figures calculated by Warren. This contrasts with a loss of one seat (falling to six total) that Alabama would receive if undocumented persons were included in the apportionment populations of the states.

How do these apportionment seat assignments using the 2018 undocumented counts provided by Warren as the base compare to the 2016 undocumented counts provided by Pew as the base, as I presented in my earlier reports? As already noted, Alabama retains the 7th seat using as the base either the Pew counts for 2016 or the Warren counts for 2018. But there are two other differences between the numbers from the Pew-2016 base and the numbers from the Warren-2018 base. New Jersey receives 11 under the Pew base versus 12 under the Warren base. Texas receives 38 under the Pew base versus 37 under the Warren base. But Alabama retains 7 seats

using either the Pew-2016 numbers as the base or the Warren-2018 numbers as the base.

2b. Using the Pew 2017 estimates of the counts of undocumented immigrants.

I next developed the second of the five models excluding undocumented immigrants from the apportionment populations. I obtained 2017 data on the estimated numbers of undocumented persons in the states produced by the demographers Jeffrey Passel and D'Vera Cohn of the Pew Research Center, that were published on June 12, 2019 and are available online at: https://www.pewresearch.org/fact-tank/2019/06/12/us-unauthorized-immigrant-population-2017/.

I divided these 2017 undocumented estimates produced by Pew by the 2017 Census Bureau estimates of the resident populations of the states, to produce estimated proportions of undocumented immigrants in the states in 2017. I then multiplied the proportions of undocumented immigrants in each state in 2017 by the states' projected 2020 resident populations and subtracted the resulting numbers from their 2020 resident populations. I then added in my estimates of the state's overseas population, as discussed above, to produce 2020 apportionment populations minus the undocumented persons following the Pew 2017 counts.

I next used the Method of Equal Proportions to apportion the House using these adjusted 2020 state apportionment population numbers that do not include the

estimates of undocumented immigrants, using the Pew 2017 undocumented numbers as the base. Alabama ends up retaining 7 seats in 2020, if the apportionment populations exclude undocumented persons estimated on the basis of the undocumented figures calculated by Pew. This contrasts with a loss of one seat (falling to six total) that Alabama would receive if undocumented persons were included in the apportionment populations.

How do these apportionment seat assignments using the 2017 Pew undocumented counts as the base compare to the 2016 undocumented counts provided by Pew as the base that I used in my earlier reports? I just noted that Alabama receives the 7th seat using as the base either the Pew counts for 2016 or the Pew counts for 2017. But there are two other differences between the apportionment results using the Pew-2016 base and those using the Pew-2017 base. New Jersey receives 11 under the Pew-2016 base versus 12 under the Pew-2017 base. And Florida receives 29 under the Pew-2016 base versus 28 under the Pew-2017 base.

But the key finding is that Alabama retains 7 seats using either the Pew-2016 numbers as the base or the Pew-2017 numbers as the base.

2c. Using the Pew 2017 high estimates of the counts of undocumented immigrants.

I developed the third of the five models excluding undocumented immigrants from the apportionment populations in the following way: The 2017 data on the

estimated numbers of undocumented persons in the states produced by Passel and Cohn of the Pew Research Center (used above in 2b) also contained "high" and "low" estimates of the 2017 counts of the undocumented populations of the states. In this third exercise (i.e., 2c), I used the high estimates.

I first divided these 2017 high undocumented estimates by the 2017 Census Bureau estimates of the resident populations of the states, to produce estimated proportions of undocumented immigrants in the states. I multiplied the proportions of undocumented immigrants by the states' projected 2020 resident populations and subtracted the values from their 2020 resident populations. I then added in estimates of the state's overseas population. The resulting sets of data were 2020 apportionment populations minus the undocumented persons following the Pew 2017 high counts.

I then apportioned the House. Alabama ends up retaining 7 seats in 2020, if the apportionment populations exclude undocumented persons estimated on the basis of the high undocumented figures calculated by Pew. This is exactly the same result I showed in my earlier report using the 2016 Pew data.

But there are two other differences between the apportionment results using the Pew-2016 base and those using the high Pew numbers for 2017 as the base. Florida receives 29 under the Pew-2016 base versus 28 under the so-called high

Pew-2017 base data. And Michigan receives 13 under the Pew-2016 base versus 14 under the high Pew-2017 base data.

2d. Using the Pew-2017 low estimates of the counts of undocumented immigrants.

Here are the specifics in my work developing the fourth of the five models excluding undocumented immigrants from the apportionment populations. As just noted, the 2017 Pew data on the estimated numbers of undocumented persons in the states also contained "high" and "low" estimates of the 2017 counts of the undocumented populations of the states. In this fourth exercise, I used the low estimates.

I first divided these 2017 low undocumented estimates by the 2017 Census Bureau estimates of the resident populations, to produce estimated proportions of undocumented immigrants in the states. I multiplied the proportions of undocumented immigrants by the states' projected 2020 resident populations and subtracted the values from their 2020 resident populations. I then added in estimates of the state's overseas population. The resulting sets of data were 2020 apportionment populations minus the undocumented persons following the Pew-2017 low counts.

When I then apportioned the House, Alabama ends up retaining 7 seats in 2020, if the apportionment populations exclude undocumented persons estimated on

the basis of the low undocumented figures calculated by Pew. Once again, this is exactly the same result I showed in my earlier report using the 2016 Pew data.

Again, although Alabama retains its 7th seat, there are two other differences between the apportionment results using the Pew-2016 base and those using the low Pew numbers for 2017 as base. New Jersey receives 11 under the Pew-2016 base versus 12 under the so-called low Pew-2017 base data. And Florida receives 29 under the Pew-2016 base versus 28 under the low Pew-2017 base data.

2e. Using the Pew 2017 high estimate of the undocumented population for Alabama and the Pew 2017 low estimates of the counts of undocumented immigrants for the other 49 states.

Finally, in my fifth model, I used the high Pew 2017 value of undocumented immigrants for Alabama, and the low Pew 2017 values of undocumented immigrants for the other 49 states. I first divided these 2017 undocumented estimates by the 2017 Census Bureau estimates of the resident populations, to produce estimated proportions of undocumented immigrants in the states. As before, I multiplied these proportions by the states' projected 2020 resident populations and subtracted the values from their 2020 resident populations. I then added in estimates of the state's overseas population. The resulting sets of data were 2020 apportionment populations minus the undocumented persons using the Pew 2017 data as the base; I used the high Pew estimate of undocumented persons for Alabama and the low Pew estimates for the other 49 states.

When I then apportioned the House, Alabama ends up retaining 7 seats in 2020. Once again, this is exactly the same result I showed in my earlier reports produced in January 2020 using the 2016 Pew data. Even though Alabama retains its 7th seat (the same result as before), there are two other differences between the apportionment results using the Pew-2016 base and those using the low Pew numbers for 2017 as the base for 49 states and the high Pew number as the base for Alabama. New Jersey receives 11 under the Pew-2016 base versus 12 in this analysis and Florida receives 29 under the Pew-2016 base versus 28 in this analysis.

3. Projections of the Population per Congressional District before and after removing the undocumented count estimates from the 2020 apportionment populations.

Finally, I was interested in ascertaining for 2020 the numbers of persons per House seat in the states with and without undocumented persons in the apportionment populations. For each state I first divided its 2020 apportionment population (as developed using a one-year trend line with an end point of April 1, 2020, as described above) by the number of House seats assigned to the state.

I then did this exercise twice more, employing data where undocumented persons have been removed from the counts using the Warren 2018 undocumented estimates as the base, and employing data where undocumented persons have been removed from the counts using the Pew 2017 undocumented estimates as the base.

For most of the states their population per seat calculations are larger when undocumented persons are included in the apportionment populations than when they are excluded. The differences are large for some states and small for some other states.

Using Alabama as an example, when undocumented persons are included in the 2020 counts, Alabama ends up with 823,095.5 persons per seat. When undocumented persons are excluded from the calculations using the Warren 2018 estimates as the base, Alabama ends up with 697,427 persons per seat. And when undocumented persons are excluded from the calculations using the Pew 2017 estimates as the base, Alabama ends up with 696,103 persons per seat.

One way to evaluate these population per seat data for the states is to ascertain whether the dispersion among the states becomes smaller when undocumented persons are excluded. One would prefer that the degree of dispersion across the states in the population per seat calculations be as small as possible. The smaller the variability, the more similar the states' values to the mean value across the 50 states.

I have thus calculated the standard deviation for the data measuring the population per house seat among the states using the full apportionment population counts. This is an indication of the degree of dispersion among the states in the values of their seats per population. The standard deviation has a value of 84,675.7.

Next, I calculated the standard deviation of the population per seat data for the states when undocumented persons have been removed from the apportionment populations, using the Warren 2018 estimates. The standard deviation of this distribution is 82,244.0. Finally, I calculated the standard deviation of the population per seat data for the states when undocumented persons have been removed from the apportionment populations, using the Pew 2017 estimates. The standard deviation of this distribution is 81,275.3.

These three standard deviations inform us that the population per seat counts among the states are less dispersed, that is, there is less variability in the data, when undocumented persons are excluded from the apportionment populations than when they are included.

As noted above, one of the authors of an expert report, Mr. Brace, criticized my analysis of the reduced dispersion among the states in the values of population per seat, when undocumented persons have been removed from the apportionment populations. He correctly noted that some states only receive one seat, as I also noted in my report, and he suggests that this somehow taints the dispersion analysis. Specifically, Mr. Brace states that a dispersion analysis "is irrelevant to the basic premise of reapportionment when every state gets at least one seat." Brace Report, at 16. This assertion suggests that the dispersion exercises might better be executed

by only considering those states receiving more than the one automatic seat in the House.

Even though I disagree with his reasoning, I have nonetheless removed from my calculations all seven states that I have projected will only receive the one automatic House seat in 2020, namely, Alaska, Delaware, North Dakota, Rhode Island, South Dakota, Vermont and Wyoming. I then calculated standard deviations for the three distributions mentioned above where the above seven states have been removed. The degree of dispersion among the states in their values of population per seat is smaller after removing undocumented persons from the apportionment populations. Specifically, the standard deviation among the 43 states using the data measuring the population per house seat among the states using the full apportionment population counts has a value of 60,301.0.

The standard deviation of the population per seat data among the 43 states when undocumented persons have been removed from the apportionment populations, using the Warren 2018 estimates, is 55,496.7. And the standard deviation of the population per seat data among the 43 states when undocumented persons have been removed from the apportionment populations, using the Pew 2017 estimates, is 55,738.7.

These three standard deviations allow me to conclude that the population per seat counts among those 43 states with more than the one automatic seat in the House

are less dispersed, that is, there is less variability in the data, when undocumented persons are excluded from the apportionment populations than when they are included.

IV. Conclusion

In my January 2020 reports, I used 2016 data estimates of the undocumented populations produced by the Pew Research Foundation. I showed that after removing the estimates of the undocumented populations from the apportionment populations of the states, and then reapportioning the House, Alabama retains 7 seats in the House.

In this Rebuttal, I respond to the observations of the authors of the expert reports and their criticisms of my results because I used data for 2016 and because I used data from Pew. Here I used data for 2018 from the Center for Migration Studies and for 2017 from the Pew Research Foundation. I used five different sets of data to address the criticisms of the experts.

Despite all the observations of the experts in their reports about the variability in the undocumented estimates, and also despite the fact that several experts noted the decline in the number of undocumented immigrants from 2016 to 2018, no matter which sets of estimates of undocumented immigrants that I used as the base, the end

result is the same: Alabama retains a 7th seat when estimates of undocumented persons are removed from the apportionment populations.

Overall, this work was performed in six ways: my earlier analysis using the Pew 2016 data, and then five more analyses as just described above. The result is the same. Alabama retains 7 seats when estimates of the undocumented populations are removed from the apportionment counts prior to apportioning the House.

I further note that *none* of the experts provided any calculations showing that Alabama would not lose its 7th seat if undocumented immigrants were excluded from the 2020 Census count.

I have also showed that the degree of dispersion among the states in their values of population per seat is less when undocumented persons have been removed from the apportionment populations of the states than when they are included. This conclusion obtains irrespective of whether the values for all 50 states are used in the calculation of standard deviations or whether the values of only those 43 states with more than the one automatic House seat are used in the calculation.

In short, I stand by my original reports.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the above information is true and correct to the best of my knowledge and belief.

Executed on April 13, 2020.

DUDLEY L. POSTON, JR., Ph.D.

APPENDIX

Item Descriptions for Table-Rebuttal Report

and

Table-Rebuttal Report

ITEM DESCRIPTIONS:

TABLE-REBUTTAL REPORT

Column #	Item
1	State
2	Census Bureau 2019 estimate
3	Census Bureau 2018 estimate
4	2020 resident population (((column 2 minus column 3) * 0.75) + column 2)
5	proportion of overseas population
6	2020 Apportionment population
7	seat allocation based on col 6
8	Warren 2018 undoc estimates
9	Warren estimates as proportion of 2018 CB pops (col 3)
10	2020 resident pop minus Warren undoc numbers
11	Col 9 + overseas population
12	seat allocation based on col 11
13	2020 appor pop minus PEW-17 undoc numbers
14	seat allocation based on col 13
15	2020 appor pop minus PEW-17 HI undoc numbers
16	seat allocation based on col 15
17	2020 appor pop minus PEW-17 LO undoc numbers
18	seat allocation based on col 17
19	2020 appor pop minus PEW-17 HI undoc for Al & LO for other states
20	seat allocation based on col 19
21	pop per seat, via 2020 appor pop (col 6)
22	pop per seat via 2020 minus Warren (col 11)
23	pop per seat via 2020 minus PEW-17 (COL 13)

Col #1	Col #2	Col #3	Col #4	Col #5	Col #6	Col #7	Col #8	Col #9	Col #10	Col #11	Col #12	Col #13	Col #14	Col #15	Col #16	Col #17	Col #18	Col #19	Col #20	Col #21	Col #22	Col #23
Alabama	4,903,185	4,887,871	4,914,671	0.004863	4,938,573	6	56,000	0.011457	4,858,363	4,881,992	7	4,872,722	7	4,862,591	7	4,882,853	7	4,862,591	7	823,095.5	697,427.4	696,103.1
Alaska	731,545	737,438	727,125	0.015899	738,686	1	6,000	0.008136	721,209	732,676	1	728,701	1	723,708	1	733,693	1	733,693	1	738,686.0	732,676.0	728,701.0
Arizona	7,278,717	7,171,646	7,359,020	0.003236	7,382,832	10	260,000	0.036254	7,092,227	7,115,176	10	7,093,465	10	7,067,159	10	7,119,771	10	7,119,771	10	738,283.2	711,517.6	709,346.5
Arkansas	3,017,804	3,013,825	3,020,788	0.003536	3,031,470	4	61,000	0.02024	2,959,647	2,970,113	4	2,965,882	4	2,970,927	4	2,975,972	4	2,975,972	4	757,867.5	742,528.3	741,470.5
California	39,512,223	39,557,045	39,478,607	0.002363	39,571,896	52	2,312,000	0.058447	37,171,191	37,259,028	51	37,570,114	51	37,520,069	51	37,620,158	51	37,620,158	51	760,998.0	730,569.2	736,668.9
Colorado	5,758,736	5,695,564	5,806,115	0.003129	5,824,280	8	159,000	0.027916	5,644,029	5,661,686	8	5,637,309	8	5,621,729	8	5,652,890	8	5,652,890	8	728,035.0	707,710.8	704,663.6
Connecticut	3,565,287	3,572,665	3,559,754	0.002107	3,567,254	5	116,000	0.032469	3,444,173	3,451,430	5	3,428,071	5	3,413,158	5	3,442,983	5	3,442,983	5	713,450.8	690,286.0	685,614.2
Delaware	973,764	967,171	978,709	0.003278	981,916	1	25,000	0.025849	953,411	956,535	1	951,293	1	941,086	1	961,501	1	961,501	1	981,916.0	956,535.0	951,293.0
Florida	21,477,737	21,299,325	21,611,546	0.00529	21,725,876	29	756,000	0.035494	20,844,464	20,954,736	29	20,871,725	28	20,825,135	28	20,918,315	28	20,918,315	28	749,168.1	722,577.1	745,418.8
Georgia	10,617,423	10,519,475	10,690,884	0.00412	10,734,930	14	343,000	0.032606	10,342,295	10,384,905	14	10,348,944	14	10,328,358	14	10,369,530	14	10,369,530	14	766,780.7	741,778.9	739,210.3
Hawaii	1,415,872	1,420,491	1,412,408	0.004823	1,419,220	2	35,000	0.024639	1,377,607	1,384,251	2	1,374,482	2	1,359,570	2	1,389,395	2	1,389,395	2	709,610.0	692,125.5	687,241.0
Idaho	1,787,065	1,754,208	1,811,708	0.003775	1,818,546	2	37,000	0.021092	1,773,495	1,780,189	2	1,781,475	2	1,770,883	2	1,792,067	2	1,792,067	2	909,273.0	890,094.5	890,737.5
Illinois	12,671,821	12,741,080	12,619,877	0.00263	12,653,070	17	449,000	0.03524	12,175,148	12,207,172	17	12,233,015	17	12,203,364	17	12,262,666	17	12,262,666	17	744,298.2	718,068.9	719,589.1
Indiana	6,732,219	6,691,878	6,762,475	0.002742	6,781,019	9	104,000	0.015541	6,657,378	6,675,634	9	6,669,135	9	6,658,963	9	6,679,306	9	6,679,306	9	753,446.6	741,737.1	741,015.0
Iowa	3,155,070	3,156,145	3,154,264	0.00244	3,161,959	4	52,000	0.016476	3,102,295	3,109,863	4	3,111,701	4	3,101,649	4	3,121,752	4	3,121,752	4	790,489.8	777,465.8	777,925.3
Kansas	2,913,314	2,911,505	2,914,671	0.003749	2,925,596	4	77,000	0.026447	2,837,587	2,848,224	4	2,850,275	4	2,840,233	4	2,860,318	4	2,860,318	4	731,399.0	712,056.0	712,568.8
Kentucky	4,467,673	4,468,402	4,467,126	0.00259	4,478,696	6	49,000	0.010966	4,418,140	4,429,583	6	4,438,476	6	4,428,421	6	4,448,531	6	4,448,531	6	746,449.3	738,263.8	739,746.0
Louisiana	4,648,794	4,659,978	4,640,406	0.004542	4,661,482	6	66,000	0.014163	4,574,683	4,595,461	6	4,591,824	6	4,581,872	6	4,601,775	6	4,601,775	6	776,913.7	765,910.2	765,304.0
Maine	1,344,212	1,338,404	1,348,568	0.003548	1,353,353	2	4,000	0.002989	1,344,538	1,349,308	2	1,348,287	2	1,344,235	2	1,352,340	2	1,352,340	2	676,676.5	674,654.0	674,143.5
Maryland	6,045,680	6,042,718	6,047,902	0.002837	6,065,057	8	214,000	0.035415	5,833,718	5,850,266	8	5,814,525	8	5,794,482	8	5,834,567	8	5,834,567	8	758,132.1	731,283.3	726,815.6
Massachusetts	6,892,503	6,902,149	6,885,269	0.001835	6,897,903	9	182,000	0.026369	6,703,714	6,716,015	9	6,621,376	9	6,601,265	9	6,641,487	9	6,641,487	9	766,433.7	746,223.9	735,708.4
Michigan	9,986,857	9,995,915	9,980,064	0.002832	10,008,323	13	113,000	0.011305	9,867,243	9,895,182	13	9,897,814	13	9,877,722	14	9,917,907	13	9,917,907	13	769,871.0	761,167.8	761,370.3
Minnesota	5,639,632	5,611,179	5,660,972	0.002065	5,672,663	7	87,000	0.015505	5,573,200	5,584,710	8	5,586,199	8	5,565,855	8	5,606,544	8	5,606,544	8	810,380.4	698,088.8	698,274.9
Mississippi	2,976,149	2,986,530	2,968,363	0.003688	2,979,310	4	24,000	0.008036	2,944,509	2,955,368	4	2,959,342	4	2,954,350	4	2,964,334	4	2,964,334	4	744,827.5	738,842.0	739,835.5
Missouri	6,137,428	6,126,452	6,145,660	0.003765	6,168,801	8	50,000	0.008161	6,095,503	6,118,456	8	6,108,259	8	6,093,123	8	6,123,394	8	6,123,394	8	771,100.1	764,807.0	763,532.4
Montana	1,068,778	1,062,305	1,073,633	0.005055	1,079,059	2	2,000	0.001883	1,071,611	1,077,028	2	1,073,923	2	1,069,815	2	1,078,032	2	1,078,032	2	539,529.5	538,514.0	536,961.5
Nebraska	1,934,408	1,929,268	1,938,263	0.003003	1,944,083	3	45,000	0.023325	1,893,053	1,898,738	3	1,888,395	3	1,878,270	3	1,898,520	3	1,898,520	3	648,027.7	632,912.7	629,465.0
Nevada	3,080,156	3,034,392	3,114,479	0.003289	3,124,721	4	160,000	0.052729	2,950,256	2,959,958	4	2,905,848	4	2,890,214	4	2,921,482	4	2,921,482	4	781,180.3	739,989.5	726,462.0
New Hampshire	1,359,711	1,356,458	1,362,151	0.003779	1,367,298	2	6,000	0.004423	1,356,126	1,361,250	2	1,352,025	2	1,346,933	2	1,357,116	2	1,357,116	2	683,649.0	680,625.0	676,012.5
New Jersey	8,882,190	8,908,520	8,862,443	0.001775	8,878,175	12	417,000	0.046809	8,447,599	8,462,595	12	8,434,544	12	8,400,040	11	8,469,049	12	8,469,049	12	739,847.9	705,216.3	702,878.7
New Mexico	2,096,829	2,095,428	2,097,880	0.003931	2,106,126	3	64,000	0.030543	2,033,805	2,041,799	3	2,050,650	3	2,040,564	3	2,060,737	3	2,060,737	3	702,042.0	680,599.7	683,550.0
New York	19,453,561	19,542,209	19,387,075	0.002217	19,430,048	26	684,000	0.035001	18,708,505	18,749,974	26	18,793,780	26	18,744,837	26	18,842,724	26	18,842,724	26	747,309.5	721,152.8	722,837.7
North Carolina	10,488,084	10,383,620	10,566,432	0.003177	10,600,006	14	301,000	0.028988	10,260,133	10,292,733	14	10,264,674	14	10,244,038	14	10,285,310	14	10,285,310	14	757,143.3	735,195.2	733,191.0
North Dakota	762,062	760,077	763,551	0.004927	767,313	1	7,000	0.00921	756,519	760,246	1	757,155	1	752,076	1	762,234	1	762,234	1	767,313.0	760,246.0	757,155.0
Ohio	11,689,100	11,689,442	11,688,844	0.002773	11,721,257	15	95,000	0.008127	11,593,848	11,625,998	16	11,625,746	16	11,605,639	16	11,645,854	16	11,645,854	16	781,417.1	726,624.9	726,609.1
Oklahoma	3,956,971	3,943,079	3,967,390	0.003607	3,981,700	5	84,000	0.021303	3,882,872	3,896,877	5	3,890,536	5	3,880,407	5	3,900,666	5	3,900,666	5	796,340.0	779,375.4	778,107.2
Oregon	4,217,737	4,190,713	4,238,005	0.004576	4,257,399	6	119,000	0.028396	4,117,662	4,136,506	6	4,154,632	6	4,139,217	6	4,170,047	6	4,170,047	6	709,566.5	689,417.7	692,438.7
Pennsylvania	12,801,989	12,807,060	12,798,186	0.002561	12,830,957	17	187,000	0.014601	12,611,315	12,643,608	17	12,640,580	17	12,615,530	17	12,665,630	17	12,665,630	17	754,762.2	743,741.6	743,563.5
Rhode Island	1,059,361	1,057,315	1,060,896	0.002546	1,063,597	1	24,000	0.022699	1,036,814	1,039,454	1	1,028,466	1	1,018,429	1	1,038,503	1	1,038,503	1	1,063,597.0	1,039,454.0	1,028,466.0
South Carolina	5,148,714	5,084,127	5,197,154	0.004456	5,220,313	7	75,000	0.014752	5,120,487	5,143,304	7	5,126,803	7	5,116,413	7	5,137,193	7	5,137,193	7	745,759.0	734,757.7	732,400.4
South Dakota	884,659	882,235	886,477	0.006855	892,554	1	5,000	0.005667	881,453	887,495	1	882,290	1	877,159	1	887,422	1	887,422	1	892,554.0	887,495.0	882,290.0
Tennessee	6,829,174	6,770,010	6,873,547	0.004621	6,905,310	9	126,000	0.018611	6,745,620	6,776,792	9	6,771,646	9	6,756,223	9	6,787,068	9	6,787,068	9	767,256.7	752,976.9	752,405.1
Texas	28,995,881	28,701,845	29,216,408	0.004886	29,359,154	39	1,795,000	0.06254	27,389,227	27,523,047	37	27,699,542	38	27,647,680	38	27,751,405	38	27,751,405	38	752,798.8	743,866.1	728,935.3
Utah	3,205,958	3,161,105	3,239,598	0.002489	3,247,662	4	92,000	0.029104	3,145,313	3,153,143	4	3,132,490	4	3,122,020	4	3,142,961	4	3,142,961	4	811,915.5	788,285.8	783,122.5
Vermont	623,989	626,299	622,257	0.007345	626,827	1	4,000	0.006387	618,282	622,824	1	621,801	1	617,781	1	625,822	1	625,822	1	626,827.0	622,824.0	621,801.0
Virginia	8,535,519	8,517,685	8,548,895	0.004588	8,588,120	11	266,000	0.031229	8,281,920	8,319,921	11	8,309,286	11	8,289,007	11	8,329,565	11	8,329,565	11	780,738.2	756,356.5	755,389.6
Washington	7,614,893	7,535,591	7,674,370	0.004287	7,707,271	10	271,000	0.035963	7,398,379	7,430,096	10	7,447,092	10	7,426,277	10	7,467,906	10	7,467,906	10	770,727.1	743,009.6	744,709.2
West Virginia	1,792,147	1,805,832	1,781,883	0.003681	1,788,442	2	3,000	0.001661	1,778,923	1,785,471	2	1,783,518	2	1,779,578	2	1,787,458	2	1,787,458	2	894,221.0	892,735.5	891,759.0
Wisconsin	5,822,434	5,813,568	5,829,084	0.001977	5,840,608	8	73,000	0.012557	5,755,889	5,767,269	8	5,765,024	8	5,749,908	8	5,780,141	8	5,780,141	8	730,076.0	720,908.6	720,628.0
Wyoming	578,759	577,737	579,526	0.008293	584,331	1	4,000	0.006924	575,513	580,286	1	579,288	1	578,784	1	583,323	1	583,323	1	584,331.0	580,286.0	579,288.0
																				84,675.7	82,243.9	81,275.3
																				sd	sd	sd

CERTIFICATE OF SERVICE

This is to certify that on the 17th day of February, 2021, a copy of the Sworn Declaration and Rebuttal Expert Report of D. Sunshine Hillygus pursuant to Federal Rule of Civil Procedure 26(a)(2) was served electronically to counsel of record agreed to by the parties.

/s/ Amanda Meyer