IN THE UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF CALIFORNIA

STATE OF CALIFORNIA, by and through Attorney General Xavier Becerra, Plaintiff, v. WILBUR L. ROSS, JR., in his official capacity as Secretary of the U.S. Department of Commerce; U.S. DEPARTMENT OF COMMERCE; RON JARMIN, in his official capacity as Acting Director of the U.S. Census Bureau; U.S. Census Bureau; DOES 1-100, Defendants.	Case No. 3:18-cv-01865
CITY OF SAN JOSE, a municipal corporation; and BLACK ALLIANCE FOR JUST IMMIGRATION, a California Non-Profit Corporation, Plaintiffs, vs. WILBUR L. ROSS, JR., in his official capacity as Secretary of the U.S. Department of Commerce; U.S. DEPARTMENT OF COMMERCE; RON JARMIN, in his official capacity as Acting Director of the U.S. Census Bureau; U.S. CENSUS BUREAU, Defendants.	Case No. 5:18-cv-02279

DECLARATION OF COLM O'MUIRCHEARTAIGH, PhD IN SUPPORT OF PLAINTIFFS' OPPOSITION TO DEFENDANTS' MOTION FOR SUMMARY JUDGMENT

I. Background and Qualifications

I am Professor (Dean from 2009-2014) in the Harris School of Public Policy and Senior Fellow (formerly Vice-President for Statistics and Methodology) at the National Opinion Research Center (NORC), both at the University of Chicago. I served previously as a faculty member in the Department of Statistics at the London School of Economics and Political Science (LSE) from 1971-1998 and as founding Director of the LSE's Methodology Institute. I have published numerous articles in peer-reviewed scholarly journals in statistics and social science, and a substantial number of other scholarly writings.

I am a Fellow of the American Statistical Association and of the Royal Statistical Society, a member of the American Association for Public Opinion Research, and an elected member of the International Statistical Institute. I have served as President of the International Association of Survey Statisticians, as Council Member of the International Statistical Institute, as Chair of the Social Statistics Section of the American Statistical Association, and as Chair of the Survey Research Section of the Royal Statistical Society. I am a member of the Federal Economic Statistics Advisory Committee (FESAC) and of the Committee on National Statistics (CNSTAT) of the National Academies of Science, Engineering and Medicine. I served previously as a member of the Federal Advisory Committee of Professional Associations of the U.S. Bureau of the Census (representing the American Statistical Association) and as a member of both the National Academies' *Panel on Residence Rules for the 2010 Census* and the *Panel on Improving Federal Statistics for Policy and Social Science Research Using Multiple Data Sources and State-of-the-Art Estimation Methods*. I have been a member of the Advisory Boards of the Panel Study on Income Dynamics (PSID) and the National Longitudinal Study of Adolescent Health (Add Health).

My research has focused on the design of complex surveys across a wide range of populations and topics, and on fundamental issues of data quality, including the impact of errors in responses to survey questions, cognitive aspects of question wording, and latent variable models for non-response. In 2018, I received the Monroe G. Sirken Award in Interdisciplinary Survey Research Methods from the American Statistical Association.

I have served as a consultant to a wide range of public and commercial organizations in the United States, the United Kingdom, Ireland, Italy, and the Netherlands. Through my work with the United Nations (FAO, UNDP, UNESCO), OECD, the Commission of the European Communities, the International Association for Educational Assessment, and others, I have worked also in France, China, Myanmar, Kenya, Lesotho, and Peru.

I received a BA in Mathematics and Economics from University College Dublin and an MSc and PhD in Statistics from the London School of Economics.

I am being compensated at the rate of $650 an hour.

My curriculum vitae, which contains a list of my publications, a selection of my research experience, and my prior testimony, is attached.

II. Summary of Opinions

On March 26, 2018, U.S. Commerce Secretary Wilbur Ross issued a memorandum announcing that the 2020 Census questionnaire would include a question on citizenship.[1] I have been retained by plaintiffs' counsel to evaluate the effect that adding a citizenship question to the 2020 Census would have on census response rates, and ultimately, the population count. My expert opinions are based on my review of academic and governmental sources (including Census Bureau research), as well as the depositions taken of Census Bureau professionals. I also rely on my own background and research on survey methodology, and on my familiarity with the Census Bureau's activities.

Based on my analysis, I have the following expert opinions:

- There has been a differential undercount of hard-to-count subpopulations—in particular, the Hispanic population, the immigrant population, and non-citizens in general—in all recent censuses.

- The introduction of a citizenship question on the 2020 census questionnaire will exacerbate the differential non-response—both self-response and enumerator response—among these subpopulations.

- There are strong grounds to believe that the processes designed by the Census Bureau to count people who elect not to respond—through the use of administrative records, proxy responses, and other methods of imputation—will be differentially unsuccessful for the subpopulations that are most likely not to respond to the 2020 Census because of the citizenship question. There is no evidence to suggest that these Census Bureau processes will eliminate the impact of the differential non-response; indeed, there is some indication that these processes will exacerbate it.

- There is evidence that the macro-environment in which the Census will be conducted is deteriorating rapidly in terms of trust in the Census Bureau's ability to treat responses as confidential, especially among these subpopulations. If

[1] Memorandum from Wilbur Ross on Reinstatement of a Citizenship Question on the 2020 Decennial Census Questionnaire (Ross Memo) (Mar. 26, 2018), AR 001313-AR 001320.

these conditions remain or intensify, all of the negative effects noted in this report will be increased.

- The current design of the 2020 Census—specifically the inclusion of a citizenship question on the census questionnaire—will result in an increased differential undercount of these subpopulations.

III. Background on the Decennial Census

The Constitution requires the decennial census for the purpose of apportioning congressional seats. The census is also used for other purposes, including to allocate billions of dollars in federal funds to states and local governments.

Although the Census Bureau aims to count every person residing in the United States, historically the census has disproportionately undercounted members of what the Bureau terms "hard-to-count populations."[2] These include minorities, renters, and young children.[3] As the Census Bureau concedes, hard-to-count populations are less likely than other populations to initially respond to the census, and require more follow-up efforts by the Census Bureau in order to count them.[4]

IV. Stages and Methods of the Census Enumeration

The census data collection program proceeds in broadly three stages:

1) Self-Response: The first stage of data collection in the 2020 Census will be to solicit self-responses through three modes—internet, paper, and telephone. Materials will be mailed or delivered to all addresses on the Master Address File (MAF); there will be some updating of the MAF in the field.[5] Respondents can self-respond by completing the questionnaire on the internet, by completing and mailing a paper questionnaire, or by telephone through the Census Questionnaire Assistance (CQA).[6]

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[2] See, e.g., Mule (2012), *Census Coverage Measurement Estimation Report: Summary of Estimates of Coverage for Persons in the United States*, U.S. Census Bureau, Decennial Statistical Studies Division, at pp. 1-2, available at https://www.census.gov/coverage_measurement/pdfs/g01.pdf.

[3] U.S. Government Accountability Office, "Actions Needed to Address Challenge to Enumerating Hard-to-Count Groups" (July 2018), GAO-18-599, p. 3, https://www.gao.gov/assets/700/693450.pdf.

[4] Jarmin Dep. (Aug. 20, 2018), at 265:6-16, 266:1-4.

[5] U.S. Census Bureau, *Proposed Information Collection; Comment Request; 2020 Census* (June 8, 2018), Federal Register Vol. 83, No. 111, at p. 26645, available at https://www.gpo.gov/fdsys/pkg/FR-2018-06-08/pdf/2018-12365.pdf.

[6] U.S. Census Bureau, *Proposed Information Collection; Comment Request; 2020 Census* (June 8, 2018) Federal Register Vol. 83, No. 111, at p. 26647.

2) Enumerator Non-Response Follow-Up (Enumerator NRFU): Subsequent to the self-response process, enumerators are sent in person to call on households/housing units that have not responded.[7]

3) Where the Enumerator NRFU is unsuccessful, cases may be resolved through (i) an administrative record follow-up where data for the unit is obtained from government administrative records and ascribed to the household; (ii) use of proxy respondents (a neighbor or other willing informant is asked to provide information about the household); or (iii) other methods of imputation.[8]

V. Effect of the Citizenship Question at Each Stage of Enumeration

Secretary Ross stated in his March 26 memorandum that the citizenship question has been "well tested" through its use on the American Community Survey (ACS).[9] But introducing a citizenship question is a substantial change to the decennial census questionnaire. The question has not been tested either (i) in the form in which it is being proposed in the census questionnaire, or (ii) in the context of census data collection.

A large body of work in survey methodology, including work by the Census Bureau itself and by other federal statistical agencies, has established the critical importance of pretesting all aspects of a data collection operation.[10] These factors include mode of data collection, introductory materials, context, question order, and question wording. Building on work combining the insights of psychology and survey methodology,[11] qualitative methods were established as a core component of survey questionnaire design in federal surveys.[12] Considerations of topic sensitivity and confidentiality are

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[7] U.S. Census Bureau, *Proposed Information Collection; Comment Request; 2020 Census* (June 8, 2018), Federal Register Vol. 83, No. 111, at p. 26648-26649.

[8] U.S. Census Bureau, *Proposed Information Collection; Comment Request; 2020 Census* (June 8, 2018), Federal Register Vol. 83, No. 111, at p. 26649.

[9] Ross Memo (Mar. 26, 2018), at AR 001314.

[10] Schuman and Presser, (1996) *Questions and Answers in Attitude Surveys: Experiments on Question Form, Wording, and Context*, SAGE Publications, Inc., New York; Sudman, et al. (1996) *Thinking about Answers: The Application of Cognitive Processes to Survey Methodology*, Jossey-Bass, Inc., San Francisco; Groves, et al., (2009) *Survey Methodology (2nd)*, John Wiley & Sons, Hoboken, New Jersey, pp. 97-98; Presser, et al. (2004) "Methods for Testing and Evaluating Survey Questions," *Public Opinion Quarterly*, 68(1), pp. 109-130; Clark, et al. (2003), U.S. Census Bureau, *Census Bureau Standard: Pretesting Questionnaires and Related Materials for Surveys and Censuses* (2003), available at https://www.census.gov/srd/pretest-standards.html; DeMaio (2005), *Standards for Pretesting Questionnaires and Survey Related Materials for U.S. Census Bureau Surveys and Censuses*, U.S. Census Bureau; Biemer and Lyberg (2003), *Introduction to Survey Quality*, John Wiley and Sons, Hoboken, New Jersey.

[11] Sirken, et al. (1999) *Cognition and Survey Research*, John Wiley and Sons, New York.

[12] Office of Management and Budget, *Evaluating Survey Questions: An Inventory of Methods, Statistical Policy Working Paper 47* (Jan. 2016), Statistical and Science Policy Office, available at https://www.bls.gov/osmr/spwp47.pdf.

identified as being particularly important in federal data collection.[13] Research on the censuses of 1990 and 2000 has demonstrated the significance of confidentiality in census implementation.[14] This evidence has been confirmed by later Census Bureau research.[15] The characteristics of interviewers, and the in particular careful matching of interviewers (enumerators) with respondents has been shown to have an important impact on respondent cooperation rates.[16]

Testing is particularly important for a citizenship question because, for the enumeration of certain populations (including racial or ethnic populations and immigrants), the question has been identified by the Census Bureau as a sensitive issue.[17] The salience of this question is particularly high for certain potential respondents, most notably noncitizens and naturalized citizens and their families, and thus has a disproportionate impact on the response rate for populations containing larger proportions of noncitizens.

There were a number of research methods that the Census Bureau could have used to determine the potential effect of adding a new question to the decennial census:

1) Randomized Controlled Trials (RCTs): In an RCT, the relevant population is randomized (allocated randomly using a scientific process) into two groups; one group is given the changed stimulus, the other is given the current (unchanged) stimulus. The difference in outcome can be ascribed—with a known degree of statistical precision—to the effect of the change. Among the controls needed in a properly designed RCT are (i) the micro-context—both the control condition and treatment condition should be in

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[13] U.S. Census Bureau, *Statistical Quality Standards* (July 2013), Appendix E3-c, available at www.census.gov/content/dam/Census/about/about-the-bureau/policies_and_notices/quality/statistical-quality-standards/Quality_Standards.pdf

[14] Singer, et al. (1993), "The impact of privacy and confidentiality concerns on survey participation the case of the 1990 US Census," *Public Opinion Quarterly*, 57(4), pp. 465-482; Mayer (Feb. 7, 2002), *Privacy and Confidentiality Research and The U.S. Census Bureau Recommendations Based on a Review of the Literature*, Research Report Series, U.S. Census Bureau, Statistical Research Division, available at https://www.census.gov/srd/papers/pdf/rsm2002-01.pdf; The Leadership Conference Education Fund, Table 1a: States Ranked by Number of Hispanics Living in Hard-to-Count (HTC) Census Tracts, available at http://civilrightsdocs.info/pdf/census/2020/Table1a-States-Number-Hispanics-HTC.pdf; Singer, et al. (1993); Singer, et al., (2003), "Attitudes and Behavior: The Impact of Privacy and Confidentiality Concerns on Participation in the 2000 Census," *Public Opinion Quarterly*, 67(3), pp. 368-384.

[15] Bates, et al. (2012), *Public Attitudes Toward the Use of Administrative Records in the U.S. Census: Does Question Frame Matter*?, Research Report Series Survey Methodology #2012-04, U.S. Census Bureau, available at https://www.census.gov/srd/papers/pdf/rsm2012-04.pdf (as of Sept. 19, 2018).

[16] Mangione, et al. (1992), "Question Characteristics and Interviewer Effects," *Journal of Official Statistics,* 8(3) pp. 293-307; Durrant, et al. "Effects of Interviewer Attitudes and Behaviors on Refusal in Household Surveys" *Public Opinion Quarterly*, 74(1), pp. 1-36.

[17] U.S. Census Bureau, *Statistical Quality Standards* (July 2013), Appendix E3-C, available at www.census.gov/content/dam/Census/about/about-the-bureau/policies_and_notices/quality/statistical-quality-standards/Quality_Standards.pdf

precisely the form being proposed for the final implementation; and (ii) the macro-context—the external environment in which the data collection is carried out should mirror that of the proposed implementation. The micro-context here would include all materials presented to respondents: the introductory materials; the justification for data collection; the questionnaire length; the location in the questionnaire; and the other questions in the questionnaire.

2) Natural experiments: Natural experiments, though not as rigorous or well-founded as RCTs, can provide evidence of the effect of a stimulus. If two data collections are being carried out in a generally similar context, one of which contains the change (here, the inclusion of a citizenship question) and the other does not, differences (or relative differences) in outcomes may be used to give a general idea of the effect. The evidence from natural experiments is of lower quality than that from RCTs.

3) Qualitative research: Qualitative research is intensive research that is used to explore the way in which, or the reasons why, a change may be more or less positive or damaging to a data collection. Two particular forms of qualitative research are focus groups and debriefing interviews. Focus groups are a moderated discussion, typically with members of the target population, that explore the implications of the change for the potential respondents. Focus groups are an important tool in developing and testing a question and/or a questionnaire, and it is rare for an important data collection instrument not to employ them. Debriefing interviews with interviewers and supervisors provide survey designers with important insights into the impact of the questions and the questionnaire, and can lead to substantial modifications of a planned questionnaire design.[18]

4) Standard Census procedure: The Census Bureau and the Federal Statistical System have established strict protocols for the well-documented process for the testing of questionnaires and questions. The procedures can be found in Census Bureau documents[19] and in a statistical policy overview from the Office of Management and Budget.[20] The Census Bureau did not implement this established process before the citizenship question was added to the 2020 Census; the question was not tested in the

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[18] U.S. Office of Management and Budget, *Evaluating Survey Questions: An Inventory of Methods, Statistical Policy Working Paper 47* (Jan. 2016), Statistical and Science Policy Office, available at https://www.bls.gov/osmr/spwp47.pdf (as of Sept. 19, 2018).

[19] U.S. Census Bureau Statistical Quality Standards, *Statistical Quality Standards* (July 2013), Appendix E3-C, www.census.gov/content/dam/Census/about/about-the-bureau/policies_and_notices/quality/statistical-quality-standards/Quality_Standards.pdf; Clark, et al. (2003).

[20] Office of Management and Budget, *Evaluating Survey Questions: An Inventory of Methods. Statistical Policy Working Paper 47* (Jan. 2016). Statistical and Science Policy Office, Washington, D.C https://www.bls.gov/osmr/spwp47.pdf.

specific context of the census or a Census 2020 test, nor was it incorporated into any test of the whole Census 2020 questionnaire.[21]

In contrast, pious hope—simply claiming that processes have been or will be developed to deal with problems, without providing any evidence that they will be successful—is not accepted by any scientist as a valid justification of a procedure.

A. Self-Response

i. Survey Non-Response Generally

Non-response in a census is the failure to obtain a response from an eligible member of the population. (In a survey it is the failure to obtain a response from an eligible member of the selected sample.) Non-response can take two forms: unit non-response, where no information is obtained from the population member, and item non-response, where information on some items is obtained but no information is obtained on a particular item in the questionnaire. In the case of the census, the primary aim is to count each individual.

There are many classifications of non-response. The most common is to take three broad categories: noncontacts, refusals, and inability to respond. Noncontacts consist of failure to establish any contact with the target population unit. Refusals consist of direct (or indirect) refusal to participate once contact has been established. Inability to respond is any form of incapacity of the target unit; this could be caused by physical, mental or linguistic incapability, for instance.

Every population member has a response propensity for a particular data collection operation. The theory and applied research make it clear that (i) these propensities may vary considerably across different data collections even for the same population; and (ii) these propensities may be expected to vary considerably across a population for a single data collection.[22]

Social scientists have developed a number of ways of looking at non-response.[23] The application of many of the ideas is brought together in *leverage-salience theory*.[24] A

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[21] Abowd Dep. (Aug. 15, 2018), at 283, 291-292; U.S. Government Accountability Office, *2020 CENSUS Continued Management Attention Needed to Mitigate Key Risks Jeopardizing a Cost-Effective and Secure Enumeration: Statement of Robert Goldenkoff, Director, Strategic Issues and David A. Powner, Director, Information Technology* (Apr. 18, 2018), Testimony Before the Subcommittee on Commerce, Justice, Science, and Related Agencies, Committee on Appropriations, House of Representatives, GAO-18-416T, available at https://www.gao.gov/products/GAO-18-416T (as of Sept. 19, 2018).
[22] Groves, et al. (2009).
[23] See Groves, et al. (2009).
[24] Robert Groves, Eleanor Singer, and Amy Corning (2000), "Leverage—Saliency Theory of Survey Participation: Description and an Illustration," *Public Opinion Quarterly*, Vol. 64, Issue 3, pp. 299-308.

particular factor is given different weight in the minds of different subsets of respondents, depending on the salience of the factor, and whether it is positive or negative; the salience will be a combination of its perceived implications and the likelihood of these implications being realized.[25] The impact of the factor on response rate—positive or negative—depends on how its implications are perceived and evaluated by that potential respondent or group of potential respondents.[26] Differences in those perceptions and their impact are a major source of differential non-response.[27]

ii. Non-Response for the 2020 Census

The first stage of data collection in the 2020 Census will be to solicit self-responses through three modes – internet, paper, and telephone. Materials will be mailed or delivered to all addresses on the Master Address File. Respondents can complete the questionnaire either on the internet, by completing and mailing a paper questionnaire, or by contacting the Census Questionnaire Assistance (CQA) by telephone.

The Census Bureau has not carried out any RCTs to investigate the impact of including the citizenship question on the census questionnaire. An RCT was proposed by the census professional staff,[28] but was rejected.[29] In the absence of such a test, the best evidence available of the impact of the citizenship question on the self-response rate comes from the self-response rates to the American Community Survey (ACS). The analysis is described in Dr. Abowd's deposition testimony[30] and in a recent Census Bureau white paper[31]; the Census Bureau acknowledges that this analysis provides a conservative estimate of the increase in non-response among such households.

The Census Bureau calculates that due to the citizenship question, there will be a reduction of at least 5.8% in the self-response rate for households containing a non-citizen compared to households containing all citizens.[32] I agree with the Census Bureau's conclusion that the presence of the citizenship question on the census questionnaire will materially reduce the self-response rate for households containing a non-citizen. The consequence of including the citizenship question in the census questionnaire will be to increase disproportionately the households containing a non-citizen that will be propelled to the NRFU stage in the 2020 Census.

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[25] Groves, et al. (2000).
[26] Groves, et al. (2000).
[27] Groves, et al. (2000).
[28] Abowd Dep. (Aug. 29, 2018), at 27-28.
[29] Abowd Dep. (Aug. 29, 2018), at 104-105.
[30] Abowd Dep. (Aug. 15, 2018), at 35-42; Abowd Dep. (Aug. 29, 2018), at 241-242.
[31] J. David Brown, et al., *Understanding Quality of Alternative Citizenship Data Sources for the 2020 Census*, Center for Economic Studies, U.S. Census Bureau Working Paper 18-38 (Aug. 6, 2018), at COM_DIS00009833-COM_DIS00009909.
[32] Brown, et al. (Aug. 6, 2018), at COM_DIS00009871; Abowd Dep. (Aug. 29, 2018), at 110.

B. Non-Response Follow-up (NRFU)

Non-Response Follow-up (NRFU) is the process by which the Census Bureau attempts to collect information from households that do not respond to the census questionnaire, initially through in-person enumeration. In general, face-to-face data collection (in-person interviewing) is more successful than remote (mail, phone, internet) data collection, but face-to-face interviewing can be more problematic if the topic causes anxiety to or presents a perceived threat to the potential respondent.[33]

For studies involving interviewers, in person or on the phone, interviewer quality is critical in obtaining a response. Interviewer training and interviewer experience lead to an improved capacity on the part of the interviewer to communicate the purpose of the data collection effectively, increase the interviewer's capacity to develop rapport with the respondent, and enhance the interviewer's flexibility in tailoring the approach to each particular respondent.[34]

The Census Bureau's basic NRFU process is as follows:

- Every non-responding household will be visited in-person by a census enumerator at least once.
- The enumerator first attempts to determine whether the address exists.
- Second, the enumerator attempts to determine whether anyone lives at the address.
- Third, the enumerator attempts to complete an in-person enumeration with a knowledgeable member of the household.
- If this fails (there is a complex definition of when to determine failure), the case is referred for either or both administrative record enumeration and/or proxy enumeration; these may be carried out in parallel.
- Each household may receive up to six visits from the census enumerator, subject to the procedure for the use of administrative records.[35]

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[33] Roger Tourangeau and Ting Yan (2007), *Sensitive Questions in Surveys*, Psychological Bulletin 133, No. 5, pp. 859-883.

[34] Billiet. and Loosveldt (1988), "Improvement of the Quality of Responses to Factual Survey Questions by Interviewer Training," *Public Opinion Quarterly*, 52, pp. 190-211; Fowler and Mangione, (1990) *Standardized Survey Interviewing: Minimizing Interviewer-Related Error*, SAGE Publications, Inc., Thousand Oaks, CA; Groves and McGonagle, (2001) "A Theory-Guided Interviewer Training Protocol Regarding Survey Participation," *Journal of Official Statistics*, 17(2), pp. 249- 265; O'Brien, et al., (2002) "Interviewer Training to Increase Survey Participation," American Statistical Association, Joint Statistical Meetings – Section on Survey Research Methods; Groves, et al. (2009).

[35] U.S. Census Bureau, *Proposed Information Collection; Comment Request; 2020 Census* (June 8, 2018), Federal Register Vol. 83, No. 111, at p. 26649.

The Census Bureau predicts that the addition of a citizenship question will decrease self-response rates and thus acknowledges that there will be an increased workload for NRFU.[36] But the critical question here is whether and to what extent NRFU will be successful in enumerating households (and individuals within households) that do not respond to the census questionnaire because of the citizenship question. The Census Bureau has not carried out any RCTs to investigate the impact on the Enumerator NRFU response rate of including the citizenship question on the census questionnaire.

The closest parallel to the Enumerator NRFU (for a survey including a citizenship question) is the Computer Assisted Personal Interviewing Operation (CAPI) follow-up in the American Community Survey (ACS), which is the in-person interviewer follow-up of those who did not self-respond to the ACS. Data are available for the ACS CAPI operation for the years 2010-2016.[37]

Given that the ACS has included a citizenship question every year, the CAPI data provide an indication of the likely success rate of NRFU for potential respondents that do not self-respond to the 2020 Census because of the citizenship question.[38] The CAPI data show two trends that suggest that the differential response rate arises from the inclusion of the citizenship question in the ACS:

- In tracts containing a higher proportion of households containing a non-citizen, ACS CAPI is less successful in resolving self-response non-respondents.

- Consistently over time, ACS CAPI is less successful in resolving (completing enumeration for) self-response non-respondents in all tracts.

These trends are apparent in the two tables below.

The success of ACS CAPI in converting self-response non-respondents is directly related to the composition of the tracts in which it is being conducted. Tracts with a higher percentage of households containing at least one non-citizen have lower ACS CAPI response rates, as shown when tracts are arranged into deciles by such households. In every year, there is a higher ACS CAPI response rate in the upper deciles (deciles 1-5) than in the lower deciles (deciles 6-10). The differences (average response rate for the top five minus the average response rate for the bottom five, year by year) are shown in Table 1 below.

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[36] Abowd Memo (Jan. 3, 2018), at AR008615.
[37] CAPI Data Tables, Exhibit 12 to Abowd Dep. (Aug. 29, 2018), at AR0010408-AR0010409.
[38] CAPI Data Tables, Exhibit 12 to Abowd Dep. (Aug. 29, 2018) at AR0010408-AR0010409.

Table 1			
Year	**Response Rate, Deciles 1-5**	**Response Rate, Deciles 6-10**	**Difference**
2010	95.19%	94.11%	1.08%
2011	95.65%	94.46%	1.19%
2012	94.93%	93.32%	1.61%
2013	94.47%	92.67%	1.80%
2014	93.46%	91.68%	1.78%
2015	92.13%	90.04%	2.09%
2016	89.94%	86.63%	3.31%

Table 2 below shows the reduction in ACS CAPI response rate from 2010 to 2016 for deciles 1-10 and for the grouped deciles 1-5 versus deciles 6-10. The rate at which the ACS CAPI response rates have deteriorated varies according to the composition of the tracts. The deterioration in ACS CAPI response rate for the upper deciles (deciles 1-5) from 2010 through 2016 was 5.25%; the deterioration in the ACS CAPI response rate for the lower deciles (deciles 6-10) was 7.48%. Thus, the increased relative disadvantage since 2010 for the lower deciles was 2.23% (7.48% - 5.25%). Note that if this were formulated for the top decile versus the bottom decile, that difference was 3.03% (7.56% - 4.53%).

Table 2		
Decile	**Response Rate, 2010 vs. 2016**	**Difference**
Decile 1	96.20 – 91.67%	4.53%
Decile 2	95.75 – 90.77%	4.98%
Decile 3	95.07 – 89.85%	5.22%
Decile 4	94.60 – 89.21%	5.39%
Decile 5	94.33 – 88.18%	6.15%
Decile 6	94.08 – 87.19%	6.81%
Decile 7	93.83 – 86.71%	7.12%
Decile 8	93.89 – 85.98%	7.91%
Decile 9	93.79 – 85.87%	7.92%
Decile 10	94.96 – 87.40%	7.56%
Deciles 1-5	95.19 – 89.94%	5.25%
Deciles 6-10	94.11 – 86.63%	7.48%

Having considered the evidence from these data and other related materials, I conclude:

- The Enumerator NRFU for Census 2020 will be less successful than the Enumerator NRFU in Census 2010.
- The higher the proportion of households containing a non-citizen, the less successful the Enumerator NRFU will be.

- The relative failure of the Enumerator NRFU will be greatest in tracts with higher proportions of households containing a non-citizen.
- Combining the three points above, the net result of the Enumerator NRFU in 2020 will be to produce a more severe differential non-response in tracts containing higher proportions of non-citizens than the Enumerator NRFU in 2010.

The estimates derived above from the ACS CAPI operations will almost certainly seriously underestimate the differential non-response for tracts containing higher proportions of non-citizens for the following reasons:

- The census enumerator NRFU is a considerably lower quality field enterprise than ACS CAPI.
    - Census enumerators have less experience and less training than ACS interviewers, who are permanent Census Bureau field representatives.[39]
    - Training is particularly important for converting reluctant respondents.[40]
    - The available reservoir of language skills among potential enumerators has been reduced by the decision to employ, with few if any exceptions, only US citizens as enumerators.[41]
    - Difficulties in matching enumerators with potential respondents (language, culture) have also been exacerbated by the decision to employ, with few if any exceptions, only US citizens as enumerators.[42]
- The form of the citizenship question proposed for the census questionnaire is different from and requests more information than necessary and is more intrusive than the question in the ACS.

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[39] Jarmin Dep. (Aug. 20, 2018), at 329:15-18; Brown, et al. (Aug. 6, 2018), at COM_DIS00009862.

[40] Morton-Williams, J. (1993) "Interviewer Approaches," Aldershot, U.K.: Dartmouth; Groves, R. and McGonagle, K., (2001) "A Theory-Guided Interviewer Training Protocol Regarding Survey Participation," Journal of Official Statistics, 17(2), pp. 249- 265; O'Brien, E., Mayer, T., Groves, R., O'Niel, G., (2002) "Interviewer Training to Increase Survey Participation," American Statistical Association, Joint Statistical Meetings – Section on Survey Research Methods, pp. 2502-2507.

[41] AR004253; Bahrampour, T. (Jan. 30, 2018), "Non-citizens won't be hired as census-takers in 2020, staff is told," *The Washington Post*, available at https://www.washingtonpost.com/local/social-issues/non-citizens-wont-be-hired-as-census-takers-in-2020-staff-is-told/2018/01/30/b327c8d8-05ee-11e8-94e8-e8b8600ade23_story.html?utm_term=.f48e5255b5b3 (as of Sept. 19, 2018).

[42] AR004253; Bahrampour, T. (Jan. 30, 2018), "Non-citizens won't be hired as census-takers in 2020, staff is told," The Washington Post, available at https://www.washingtonpost.com/local/social-issues/non-citizens-wont-be-hired-as-census-takers-in-2020-staff-is-told/2018/01/30/b327c8d8-05ee-11e8-94e8-e8b8600ade23_story.html?utm_term=.f48e5255b5b3 (as of Sept. 19, 2018).

- The citizenship question—one of only eleven questions in the census questionnaire—will be more prominent in the 2020 Census than in the ACS, which has 71 questions.[43]
- The salience of the citizenship question for hard-to-count subpopulations may be increasing since 2016, and may further increase substantially by 2020, especially if any public controversy arises in relation to its inclusion in the census.
- Because in-person data collection is less successful than self-response when a question is sensitive or threatening,[44] those refusing to self-respond due to the citizenship question are particularly likely to refuse to respond in NRFU.
- There is compelling evidence from recent qualitative studies by the Census Bureau that the macro-environment for the question is deteriorating rapidly. Based on qualitative interviews and focus groups, Census Bureau experts in a September 2017 report have drawn attention to "a very significant and unprecedented trend" and reported that "respondents' fears, particularly among immigrant respondents, have increased markedly this year."[45] The Census Barriers, Attitudes, Motivators Study provides evidence of differential concern about census confidentiality between non-citizens and citizens.[46]
- Permanent Census Bureau field representatives have asked for additional training to cope with rising concerns among respondents in relation to confidentiality issues.[47]

C. Further Stages: Administrative Record Enumeration, Proxy Enumeration, and Other Methods of Imputation

Once a case has been referred to the NRFU, the Census Bureau enumerator makes at least one visit to the address to attempt an in-person enumeration. The following steps are taken:

- If that initial visit does not result in a completed household, administrative records may be used to enumerate those households for which there is high

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[43] U.S. Census Bureau, *The American Community Survey Questionnaire* (2017), available at https://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2017/quest17.pdf (as of Sept. 19, 2018).
[44] Roger Tourangeau and Ting Yan (2007), *Sensitive Questions in Surveys*, Psychological Bulletin 133, No. 5, pp. 859-883; Brown, et al (2018), at COM_DIS00009875.
[45] U.S. Census Bureau, Center for Survey Measurement, Respondent Confidentiality Concerns, *Memorandum for Associate Directorate for Research and Methodology (ADRM)* (Sept. 20, 2017), https://www2.census.gov/cac/nac/meetings/2017-11/Memo-Regarding-Respondent-Confidentiality-Concerns.pdf, at AR10386-10393.
[46] Abowd Dep. (Aug. 29, 2018), at 285:15-286:16.
[47] Jarmin Dep. (Aug. 20, 2018), at 329:20-330:10.

quality administrative data about the household, as defined by (still undetermined) Census Bureau protocols.

- For those households without administrative records, an enumerator will attempt further contact.
- If after a third attempt the household does not yield a respondent, a case will become "proxy-eligible." A proxy is someone who is not a member of the household—such as a neighbor, landlord, postal worker, or other knowledgeable person who can provide information about the unit and the people who live there. An enumerator may attempt up to three further attempts to obtain data about the household from a proxy respondent.
- If all these efforts fail, then a household becomes eligible for what is known as "whole-person imputation" or "whole household imputation," in which the Bureau imputes a full set of characteristics, including age, sex, and race/ethnicity based on external information, possibly including the characteristics of the neighborhood.[48]

i. Administrative Record Enumeration

Where it is confirmed by the enumerator that the housing unit is occupied but a response is not obtained on the first attempt, the housing unit may also be sent for an administrative record check.[49] These records may be used in the absence of a household response to impute the data for the housing unit.[50] This is an administrative record enumeration.

The effectiveness of the administrative record enumeration depends critically on the personally identifiable information (PII) available for target individuals. The Census Bureau acknowledges that the quality of PII in NRFU is lower than the quality of PII in self-response data.[51]

In a memorandum to Secretary Ross, Dr. Abowd lists groups for whom citizenship information is not available in administrative records.[52] Those in Category 6—non-

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[48] U.S. Census Bureau, *Proposed Information Collection; Comment Request; 2020 Census* (June 8, 2018), Federal Register Vol. 83, No. 111, at p. 26649, available at https://www.gpo.gov/fdsys/pkg/FR-2018-06-08/pdf/2018-12365.pdf; Abowd Dep. (Aug. 15, 2018), at 77, 220, 232; Abowd Dep. (Aug. 29, 2018), at 220, 227-228, 234-235.

[49] U.S. Census Bureau, *Proposed Information Collection; Comment Request; 2020 Census* (June 8, 2018), Federal Register Vol. 83, No. 111, at p. 26649, available at https://www.gpo.gov/fdsys/pkg/FR-2018-06-08/pdf/2018-12365.pdf; Abowd Dep. (Aug. 15, 2018), at 232-234.

[50] U.S. Census Bureau, *Proposed Information Collection; Comment Request; 2020 Census* (June 8, 2018), Federal Register Vol. 83, No. 111, at p. 26649, available at https://www.gpo.gov/fdsys/pkg/FR-2018-06-08/pdf/2018-12365.pdf; Abowd Dep. (Aug. 15, 2018), at 232-234.

[51] Abowd Memo (Mar. 1, 2018), at AR 01311.

[52] Abowd Memo (Mar. 1, 2018), at AR001310-AR001311.

citizen, non-legal permanent residents—are the least likely to appear in the records, regardless of source. The Census Bureau acknowledges that the inclusion of the citizenship question also reduces the likelihood that citizens that reside with non-citizens will not self-respond: "[I]t is common for households to include persons with a variety of citizenship statuses. If the whole household does not self-respond, to protect the members in Category 6, the record linkage problem will be further aggravated."[53]

Furthermore, the Census Bureau acknowledges that there are more likely to be administrative records for citizens than for non-citizens.[54] In using administrative records to obtain a correct enumeration, "one of the things that matter is the quality of the personally identifying information in the ad recs."[55] And "we know the characteristics of that population are much more likely to be citizens."[56]

The Census Bureau has not yet determined which administrative records it will use for administrative record enumeration or how they will be used. Whatever the process, the use of administrative records will systematically discriminate against hard-to-count subpopulations and will not correct the under-enumeration that occurs at the earlier stages of data collection.

ii. Proxy Response Enumeration

For proxy responses, the enumerator uses her discretion to identify a neighbor or other person who is available and willing to provide information about the housing unit for which an observation has not been obtained.[57] That information could range from an estimate of the number of people in the household (household count) to detailed information about each household member.[58]

If the proxy respondent appears to provide comprehensive information about the household, that information is accepted as the enumeration.[59] If the count of persons is believed known for the household but no further information is obtained, this count is accepted and whole person imputations are carried out for the characteristics of these people.[60] If it is known only that the housing unit is occupied, first the count is imputed, and then whole person imputations are carried out for the person characteristics for those imputed people.[61] It is expected that administrative records will be used to do the imputation, but resources and protocols for this process are not yet in place.[62]

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[53] Abowd Memo (Mar. 1, 2018), at AR001311- AR001312.
[54] Abowd Dep. (Aug. 29, 2018), at 253:4.
[55] Abowd Dep. (Aug. 29, 2018), 232:7-9.
[56] Abowd Dep. (Aug. 29, 2018), 232:14-16.
[57] Abowd Dep. (Aug. 29, 2018), at 220.
[58] Abowd Dep. (Aug. 29, 2018), at 220.
[59] Abowd Dep. (Aug. 29, 2018), at 228.
[60] Abowd Dep. (Aug. 15, 2018), at 232.
[61] Abowd Dep. (Aug. 15, 2018), at 232-233.
[62] Abowd Dep. (Aug. 15, 2018), at 233-235.

Given the perceived threat from the citizenship question and poorer linguistic capabilities of enumerators, willing and knowledgeable proxy respondents will likely be more difficult to find in neighborhoods where a substantial proportion of households contain a non-citizen. The Census Bureau acknowledges that proxy responses are higher for hard-to-count subpopulations, provide much lower quality information, and contain more coverage errors[63] than self-responses.[64]

iii. Other Methods of Imputation

Algorithms for household count imputation for 2020 have not yet been determined. The method for 2010 was hot-deck imputation.[65] Hot-deck imputation involves replacing missing values of one or more variables for a non-respondent (called the recipient) with observed values from a respondent (the donor) that is similar to the non-respondent with respect to characteristics observed by both cases. Hot-deck imputation by definition favors those already enumerated by other means (self-response or enumerator response); it uses observed cases to simulate unobserved cases. To the extent that a category is underrepresented in the donor class, imputation will not redress the differential undercount of hard-to-count subpopulations, but instead, will reinforce it.

Whatever the method used, imputation further systematically disadvantages hard-to-count subpopulations, in particular non-citizens and households containing non-citizens.

VI. Additional Factors that Will Increase the Likelihood and Impact of the Differential Undercount that Results from a Citizenship Question

There are a number of additional factors that will increase the probability and exacerbate the effect of an undercount of the subpopulations most likely not to respond to the 2020 Census because of the citizenship question.

A. Missing Housing Units

A necessary condition for successful inclusion in the census is that the household address appear on the census master address file (MAF), and be allocated a master address file identification number. Should the household not be identified on the MAF, and should the enumerator not find and add the address during the field enumeration, no attempt will be made to enumerate the household. There is evidence that the MAF misses a large number of households in neighborhoods containing a high proportion of

[63] Coverage errors include all forms of errors, including erroneous enumerations and omissions.
[64] See Jarmin Dep. (Aug. 20, 2018), at 270:19, 308:15-17; Abowd Dep. (Aug. 15, 2018), at 227: 2, et seq.
[65] Abowd Dep. (Aug. 29, 2018), at 248.

noncitizens because they often live in unusual or concealed housing units.[66] There is also evidence that, in general, enumerators are not successful at identifying missing housing units from an ordered list.[67] This tendency may be expected to increase if enumerators are carrying out an update in a neighborhood sensitized to census operations by controversy over the inclusion of a citizenship question in the census.

B. Concealed Partial Responses

If a household chooses to report only a subset of the residents of the household, but provides the basic information on at least one resident, no further action will be taken for that household.[68] The unit will not be sent for NRFU. Given the presence of the citizenship question on the census questionnaire, a household containing some citizens and some non-citizens may well choose to report only the citizens in a response, and might indeed be advised to do so by those who do not trust in the confidentiality of the data provided. There is no Census Bureau protocol to address this potential issue.[69]

C. Historical Data Showing an Undercount of Hard-to-Count Subpopulations

The 2010 Census produced a significant net undercount for certain key subpopulations. For Hispanics, there was a net undercount of 1.54%; for bilingual mailing areas (areas indicated by the ACS to contain households speaking multiple languages), there was a net undercount of 0.80%.[70] The Integrated Communications Plan states that "[Y]oung children having the highest net census undercount rate than any other age group, Hispanic children account for more than 36 percent for all children younger than five."[71] When asked whether it was possible that the presence of the citizenship question will exacerbate this kind of net undercount of Hispanic children, Dr. Abowd stated: "Yes, that is what we mean when we say the quality of the census count will be harmed."[72]

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[66] Edward Kissam (2017) "Differential Undercount of Mexican Immigrant Families in the US Census," *Statistical Journal of the IAOS*, 33(3), pp. 797-816; Martin, E. (2007) "Strength of attachment: Survey coverage of people with tenuous ties to residences," *Demography*, 44(2), pp. 437-440; O'Hare, et al., *The Invisible Ones: How Latino Children Are Left Out of Our Nation's Census Count* (April 2016) U.S. Census Bureau, available at ftp://ftp.census.gov/cac/nac/meetings/2016-11/2016-04-latino-children.pdf.
[67] Stephanie Eckman and Colm O'Muircheartaigh (2011) *Performance of the Half-Open Interval Missed Housing Unit Procedure*, Vol. 5 Journal of the European Survey Research Association, No. 3, pp. 125-131.
[68] Abowd Dep. (Aug. 29, 2018), at 246.
[69] Abowd Dep. (Aug. 29, 2018), at 246.
[70] Mule (2012), *Census Coverage Measurement Estimation Report: Summary of Estimates of Coverage for Persons in the United States*, U.S. Census Bureau, Decennial Statistical Studies Division, at pp. 1-2, available at https://www.census.gov/coverage_measurement/pdfs/g01.pdf; Abowd Dep., Aug. 29, 2018, at 261.
[71] U.S. Census Bureau, *2020 Census Integrated Communications Plan* (Oct. 27, 2017), available at https://www.census.gov/programs-surveys/decennial-census/2020-census/planning-management/planning-docs/integrated_com_plan.html, at 37; see also Abowd Dep., Aug. 29, 2018, at 310.
[72] Abowd Dep. (Aug. 29, 2018), at 313.

VII. Conclusion

On the basis of the available evidence, it is my expert opinion that the 2020 Census will undercount hard-to-count subpopulations, including Hispanics and non-citizens, at a greater rate than in 2010 because of the inclusion of a citizenship question on the census questionnaire. Hard-to-count populations are undercounted in every census, and there is no reason to expect that for the 2020 Census, the Census Bureau's follow-up procedures will be more successful in counting those individuals who do not respond due to the citizenship question.

I reserve the right to amend or supplement my opinions if additional information or materials become available. I declare under penalty of perjury under the laws of the United States and the State of California that the foregoing is true and correct to the best of my knowledge.

DATED: November 13, 2018

Colm O'Muircheartaigh, Ph.D.

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