

## **Declaration of Professor of Mathematics, Steven J Miller, Ph.D.**

1. My name is Steven J. Miller. I am over 18 years of age and am competent to testify in this action. All of the facts stated herein are true and based on my personal knowledge.

2. I received a B.S. in Mathematics and Physics from Yale University in 1996 and a Ph.D of Mathematics from Princeton University in 2002. I have published numerous papers and written several books on statistical topics, and have taught probability and statistics for the past 15 years.

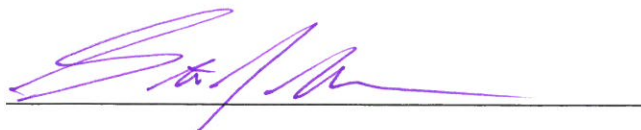
3. I am currently a professor of mathematics at Williams College. I make this declaration in my personal capacity.

4. I have analyzed phone bank data provided to me regarding responses to questions relating to mail ballot requests, returns and related issues.

5. I evaluated the data provided and performed a statistical evaluation of the data and various related calculations. I provide this declaration with regard to the report presenting my findings.

6. I can show, to a reasonable degree of professional certainty, that the conclusions as stated in this report are correct.

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



Steven J Miller, Ph.D. November 17, 2020



# REPORT ON PA GOP ABSENTEE BALLOT REQUESTS

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## EXECUTIVE SUMMARY

The analysis was performed on a data set provided by Matt Braynard and his firm, Election Data Services.

- *Estimate of ballots requested in the name of a registered Republican by someone other than that person: 40,875 to 53,909.*
- *Estimate of Republican ballots that the requester returned but were not counted: 48,522 to 44,892 (these go in the opposite order as the previous: if more of the ballots are requested by someone other than the registered voter, that means there are fewer ballots left that we estimate were incorrectly returned.).*

**Thus I estimate that the number of ballots that were either requested by someone other than the registered Republican or requested and returned but not counted range from 89,397 to 98,801.**

**Doing a more detailed analysis with confidence intervals, I estimate that almost surely (based on the data I received) that the number of ballots requested by someone other than the registered Republican is between 37,001 and 58,914, and almost surely the number of ballots requested by registered Republicans and returned but not counted is in the range from 38,910 to 56,483.**

Respectfully submitted,



Steven J Miller

November 17, 2020

## DETAILED ANALYSIS

I received a data set of responses to a phone survey given to people who are registered Republicans in PA. These people were contacted because there was a ballot requested in their name for the November 2020 election, but the ballot has not arrived to be counted as of November 16<sup>th</sup>, 2020; **there are 165,412 such ballots.**

Almost 20,000 people were called; most of the calls went to answering machines (around 14,000), had people refuse to talk (around 3000), or there was a bad number / language barrier (about 3500). There were 2684 people who answered the call on November 9<sup>th</sup> or 10<sup>th</sup>, saying either they were the person asked for or wanting to know what the call was about. These respondents were then asked several questions.

The first question was whether or not they had requested an absentee ballot; 1114 said they did, and 36 were a household member confirming the ballot request. **Thus 1150 of the 2684 confirmed requesting a ballot.** A sizeable number said they did not request a ballot: 531 said they did not while another 25 were a household member stating no absentee ballot was requested. **This sums to 556 people confirming that no ballot was requested.** Of the remaining 978 people, 343 either hung up, refused to talk, or said the person asked for is not available to talk; these 343 people were not asked subsequent questions, though there were also 91 people who said they were unsure if they had requested a ballot were asked the next question. **The remaining 544 people answered that they voted in person** and were not asked any additional questions; this response complicates the analysis as you cannot vote in person if you requested a ballot unless you bring the ballot to be cancelled. From the response 'voted in person at the polls' it is unclear if they requested an absentee ballot; we will thus do the analysis assuming they all requested and assuming none of them requested.

**We have 1241 people moving on to Question 3** (those who answered yes, had a family member answer yes, or were unsure). Of these, **463 mailed back their ballot** (though there is no record of their ballot being received; 452 said they mailed back their ballot and 11 were family members saying it was mailed) and **643 said they had not mailed back their ballot** (632 said they had not, 11 had family members say it was not mailed). The remaining people were unsure, refused to speak, hung up, or were not the right person.

Our goal is to try to estimate the number of fraudulent ballots in PA from these responses, and thus correct the totals across the commonwealth. We start with the 165,412 people who were recorded as having requested a ballot but no ballot had arrived. From Question 2 there were 1150 who confirmed requesting a ballot and 556 who did not (this is ignoring the 91 who were unsure and the 544 who said they voted in the polls). Thus we have 556 out of 1706 who said they did not request a ballot but one was requested in their name, which is about 32.59%. If we multiply the 165,412 ballots requested but unreturned by 32.59%, we get about 53,909 ballots. **Thus we estimate there are almost 54,000 ballots in the commonwealth that were requested by someone other than the registered Republican in whose name it was.**

What if we include the 544 people who answered Question 2 by saying they voted in person at the polls? If we assume all of these people brought their ballots with them to be voided, this raises the denominator from 1706 to 2250 for a percentage of around 24.18% (down from the 32.59% before). If we extrapolate **this** number to the 165,412 ballots **we now have 40,875 ballots across PA that were requested by someone other than the person in whose name they were recorded** (while this is lower than the 54,000 it is still a significant fraction of the roughly 70,000 votes separating Biden and Trump).

We now turn to estimating the number of ballots requested by registered Republicans who thought they returned them but which have not arrived and been counted (as of November 16<sup>th</sup>, 2020). From the responses,

463 people out of 1150 (or around 40.26%) said they had requested a ballot and sent it back; however, these ballots have not been counted. We need to figure out what number to apply this percentage to. We started with 165,412 ballots and now remove the estimated 53,909 ballots that were not requested by registered Republicans in their name to get there were 111,503 ballots requested by registered Republicans in PA. Multiplying this by 40.26% yields **44,892 Republican ballots that the requesters returned but were not counted.** If instead we remove the lower estimate of 40,875 ballots (for the number of ballots requested in someone's name but not by them) and subtract that from 165,412 we get 120,520 ballots requested by registered Republicans in PA. Multiplying this by 40.26% yields **48,522 Republican ballots that the requester returned but were not counted.**

## EXTENSION: CONFIDENCE INTERVALS

We can do a more detailed analysis and obtain confidence intervals. If we have a large number of data points (usually more than 30 suffice; as we are in the hundreds to thousands there are no concerns) and we observe in a sample of size  $n$  of a population of size  $N$  that  $x$  have a property, we can extrapolate that to how many in the entire population have the property.

The simplest estimate is that the proportion in the sample with the property is  $p = x/n$ . so the number in the entire population is just  $pN = x N / n$ . The difficulty with that is small errors in our estimate of the proportion in the sample scale. Thus we frequently construct 95% and 99% confidence intervals.

If each person from the population of size  $N$  is independently chosen to be in the sample of size  $n$ , and each person has the same probability  $p$  of having the desired property, then the number of people in the sample with the property can be approximated by a normal distribution. We have 95% of the mass of the normal is within 1.96 standard deviations of the mean, and 99% is within 2.576 standard deviations. This leads to the following confidence intervals, where below  $p$  is the observed sample proportion having the property ( $p = x/n$ ):

- 95% confidence interval for the probability:  $p - 1.96 \sqrt{\frac{p(1-p)}{n}}$  to  $p + 1.96 \sqrt{\frac{p(1-p)}{n}}$
- 99% confidence interval for the probability:  $p - 2.576 \sqrt{\frac{p(1-p)}{n}}$  to  $p + 2.576 \sqrt{\frac{p(1-p)}{n}}$

Once we have these, we can extrapolate to the entire population by multiplying by  $N$ :

- 95% confidence interval for the number with property:  $p - 1.96 N \sqrt{\frac{p(1-p)}{n}}$  to  $p + 1.96 N \sqrt{\frac{p(1-p)}{n}}$
- 99% confidence interval for the number with property:  $p - 2.576 N \sqrt{\frac{p(1-p)}{n}}$  to  $p + 2.576 N \sqrt{\frac{p(1-p)}{n}}$

We now apply this to our problem. For the first question, we had either 556 out of 1706 who said they did not request a ballot but we know one was requested in their name, or (including the 544 who said they voted in person) we have 556 out of 2250.

- 95% confidence interval for the probability: [30.46%, 34.92%] or [22.93%, 26.49%],
- 99% confidence interval for the probability: [29.76%, 35.62%] or [22.37%, 27.05%].

We can use this to estimate the number of ballots requested by someone other than the registered Republican:

- 95% confidence interval for such ballots: [50,380, 57,755] or [37927, 43823],
- 99% confidence interval for such ballots: [49,222, 58,914] or [37001, 44750].

Thus we estimate the number of ballots requested by someone other than the registered Republican in PA for the 2020 election is almost surely between 49,222 and 58,914 (if we assume the 544 who said they voted in person did not request an absentee ballot), or between 37,001 and 44,750 (if we assume the 544 who said they voted in person did request an absentee ballot). Thus **almost surely the number of ballots requested by someone other than the registered Republican is between 37,001 and 58,914.**

We can apply a similar analysis to the number of ballots that responders said were returned but were not received. Here we have 463 of 1150 registered Republicans saying they had requested and returned a ballot, but as of November 16<sup>th</sup>, 2020 no ballot in their name had arrived to be counted. It is easy to construct 95% and 99% confidence intervals for these probabilities (we observed 40.26%).

- 95% confidence interval for the probability: [37.43%, 43.10%],
- 99% confidence interval for the probability: [36.54%, 43.99%].

To estimate a 95% or 99% confidence interval we need to know how many ballots to remove from the 165,412. We can compute this many different ways, but in the interest of obtaining the simplest, widest range we can look at the high and low values from the above analysis of what to subtract from 165,412: 37,001 and 58,914. Thus using the 99% confidence interval values we obtain that **almost surely the number of ballots requested by registered Republicans and returned but not counted is in the range from 38,910 to 56,483.**

Respectfully submitted,



Steven J Miller

November 17, 2020

