

PENNSYLVANIA 2020 VOTING ANALYSIS REPORT

11-16-20 (rev 7-18-21)



— DRAFT —

Due to the fluidity of the election information available, this report is a living document. The authors of this report (all unpaid volunteers) generated a statistical analysis based on limited data and even more restricted time constraints. As relevant new data becomes available, an update will be issued, and the revision date changed. If any readers have data to share, comments, or corrections, please email them [here](#).

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Executive Overview

This scientific analysis of the reported Pennsylvania (PA) 2020 Presidential voting results, is a non-partisan effort by unpaid citizens and volunteer experts. Our only objective is to play a small role in helping assure that all legal PA votes are counted, *and* that only legal PA votes are counted.

Whether Donald Trump or Joseph Biden wins is not of concern in this analysis — the scientists involved with the report just want the election results to truly reflect the wishes of Pennsylvania voting citizens.

Since there are multiple reports of voting chicanery circulating the Internet, a collection of statisticians and other scientists volunteered to examine the reported PA results from a scientific statistical perspective.

We feel that the best way to do this is to start by putting ourselves in the shoes of bad actors — and then considering how they might go about changing the wishes of PA citizens, into a different result. Some of the actions they might take are:

- 1 - Keep ineligible people (e.g., deceased, moved, etc.) on the voting rolls.
(This would disguise actual voter participation rates, allow fabricated votes to be submitted in their names, etc.)
- 2 - Get legislation passed that did not require in-person voter identification.
(This would make it easier for non-citizens, felons, etc. to vote.)
- 3 - Encourage a much higher percentage of voting by mail.
(This would make it much easier to manipulate, as in-person checking is a more secure way to keep track of actual registered citizens, etc.)
- 4 - Discard envelopes and other identifying materials from mail-in votes.
(This makes it very hard to check for duplications, etc.)
- 5 - Count mail-in votes without careful signature or registration verification.
(This makes mail-in an easier choice for manipulators.)
- 6 - Allow votes to count that are received after Election Day.
(This can direct where mail-in votes are needed to go.)
- 7 - Stop vote counting for several hours before the final tabulations.
(This allows for an assessment of how many votes are “needed” etc.)
- 8 - Do not allow genuine oversight of voting tabulation.
(This would make it easier to lose or miscalculate actual votes.)
- 9 - Connect voting machines or precincts to the Internet.
(This makes it quite easy for third parties to access and change votes.)
- 10-Distribute vote manipulations over multiple precincts and/or counties.
(This makes the adjustments more difficult to find.)
- 11-Make most of the manipulations in unexpected districts.
(In other words, don’t do as much manipulation where it’s expected.)
- 12-Use multiple methodologies to change vote results.
(It requires a much longer investigation to find all the adjustments.)

There are undoubtedly more strategies those who are trying to control our politics would employ — but this is a representative sample. It should also be clear that many of these are difficult and time-consuming to find.

Frequently there is documented proof of some of these voting actions (e.g., leaving non-eligible voters on the rolls). However, these are usually dismissed with cursory responses such as: *we're doing the best that we can*, or *these deviations are not statistically significant*, or *our rolls are as accurate as other states*, or *there are some benefits for doing this* (e.g., #3 & #6), etc.

However, studies like [this](#) and reports like [this](#) do not instill confidence that election results actually reflect the wishes of actual citizens.

So what can we do as scientists? Clearly we can't verify the legitimacy of every Pennsylvania vote submitted. On the other hand we can (from a scientific perspective along with sufficient data) provide a statistically strong assessment that reported votes in certain locations are statistically unusual. Such a determination should be treated as an indication that some type of accidental or purposeful manipulation almost certainly occurred.

Such a science-based statistical analysis can not identify exactly what happened — or prove that fraud was involved. Honest mistakes, unintentional computer glitches, etc. can and do happen.

We approached this project assigning different experts to look at the Pennsylvania data from different perspectives. By-and-large the experts worked mostly independently of each other. As a result, there may be some overlaps in the analyses in the following “chapters.”

All of the experts agreed that there were major statistical aberrations in some of the Pennsylvania results, that are extremely unlikely to occur naturally.

Using more conventional statistical analyses, we identified eleven (11) counties with abnormal results (see Chapter 2). Due to time, data and manpower limitations, for this Report we focused on the statistical analysis for the worst five (5) counties. **Our strong recommendation is that each of those five Pennsylvania counties have a thorough and accurate audit.**

If the results of such an audit are that there is **no** significant change in voting results for all of these five counties (very unlikely), then the authors of this Report recommend that we write off those county deviations as an extreme statistical fluke, and that the Pennsylvania voting results be certified.

On the other hand, if the results of such an audit are that there **are** significant changes in voting results for some of these five counties, then the authors of this Report recommend that (as a minimum) the next six (6) statistically suspicious counties also have a thorough and accurate audit prior to any certifying of the Pennsylvania voting results.

See **Summary** on the final page, for more conclusions. (Note: we have done a report with similar analyses for Michigan. Contact the undersigned for a copy.)

— Editor, physicist John Droz, jr.

1 - Time Series Analysis of Trump and Biden Votes in Pennsylvania

[Dr. Louis Anthony Cox, jr.](#)

As shown in Figure 1, data on cumulative counts for Trump and Biden in PA over the course of three days from November 4 to November 7 started with Trump ahead by more than 0.5M (by 540,522) at 11:00 AM on November 4 (time "0" on the left side of Figure 1). By 11:29 AM on November 7 (right end of Figure 1), the Biden curve had caught up with, and slightly exceeded (by 34,202) the Trump curve, with values at that time of 3,344,528 for Biden and 3,310,326 for Trump. The Biden count curve thus starts about 18% below the Trump count curve and ends up being about 1% above it ($34202/3310326 = 0.0103$). Even without detailed analysis, it is visually clear that the final values are remarkably close. This invites the question of whether such a coincidence indicates external intervention to close the initial gap between the curves, or whether it might plausibly have occurred without external intervention.

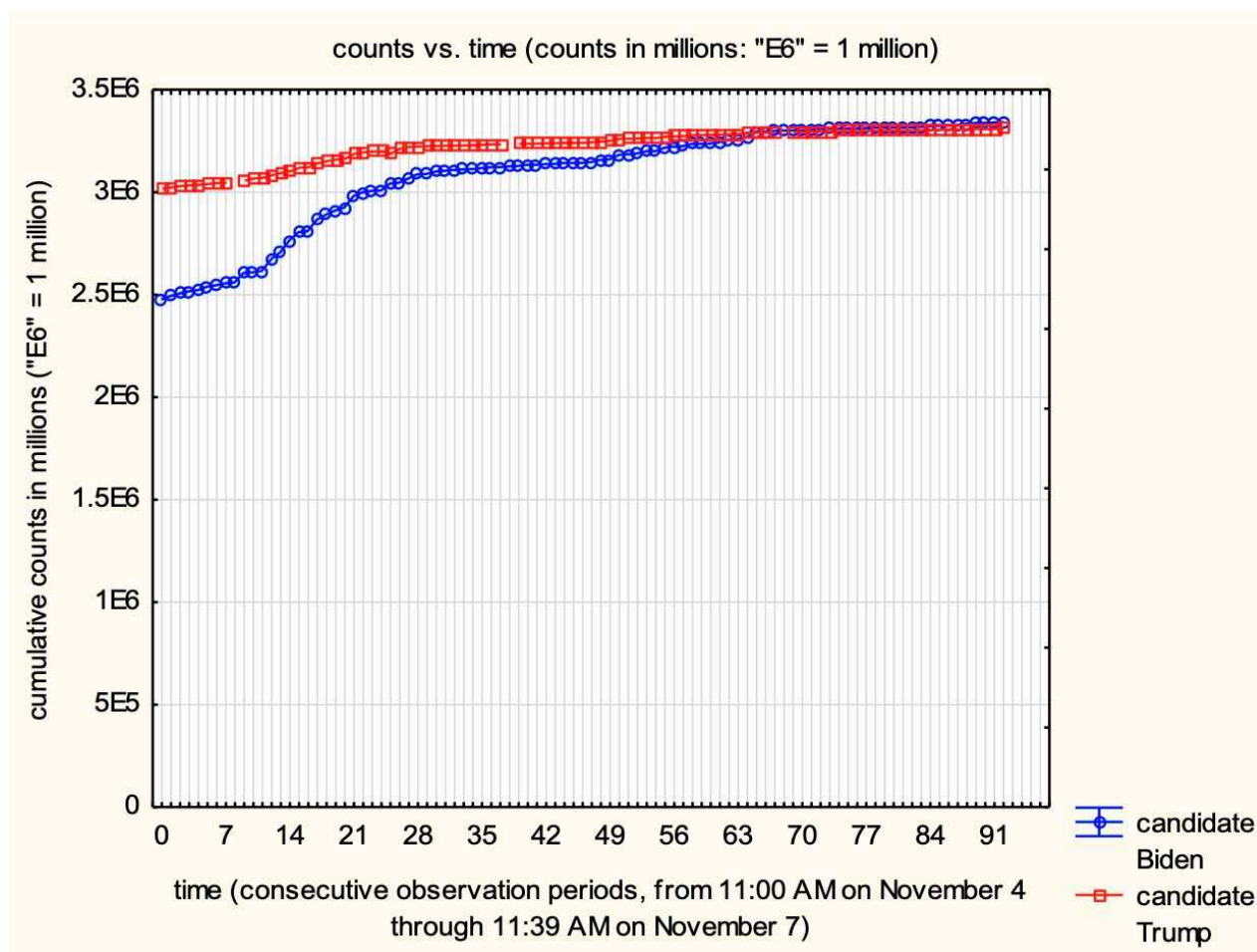


Figure 1. Time courses of Biden and Trump counts in Pennsylvania from 11:00 AM November 3 to 11:29 AM November 7, 2020

How likely it is that such a near-coincidence of final counts (with the Biden curve finishing within about 1% of the Trump curve) would occur in the absence of external interference that brings the two curves together so closely? Although history never reveals its alternatives, computational statistics can help to determine what is plausible. Figure 2 shows the approximate frequency distribution (histogram) of increments for Biden counts from period to period, with most being relatively small (left bar) but a few being an order of magnitude greater (right bar).

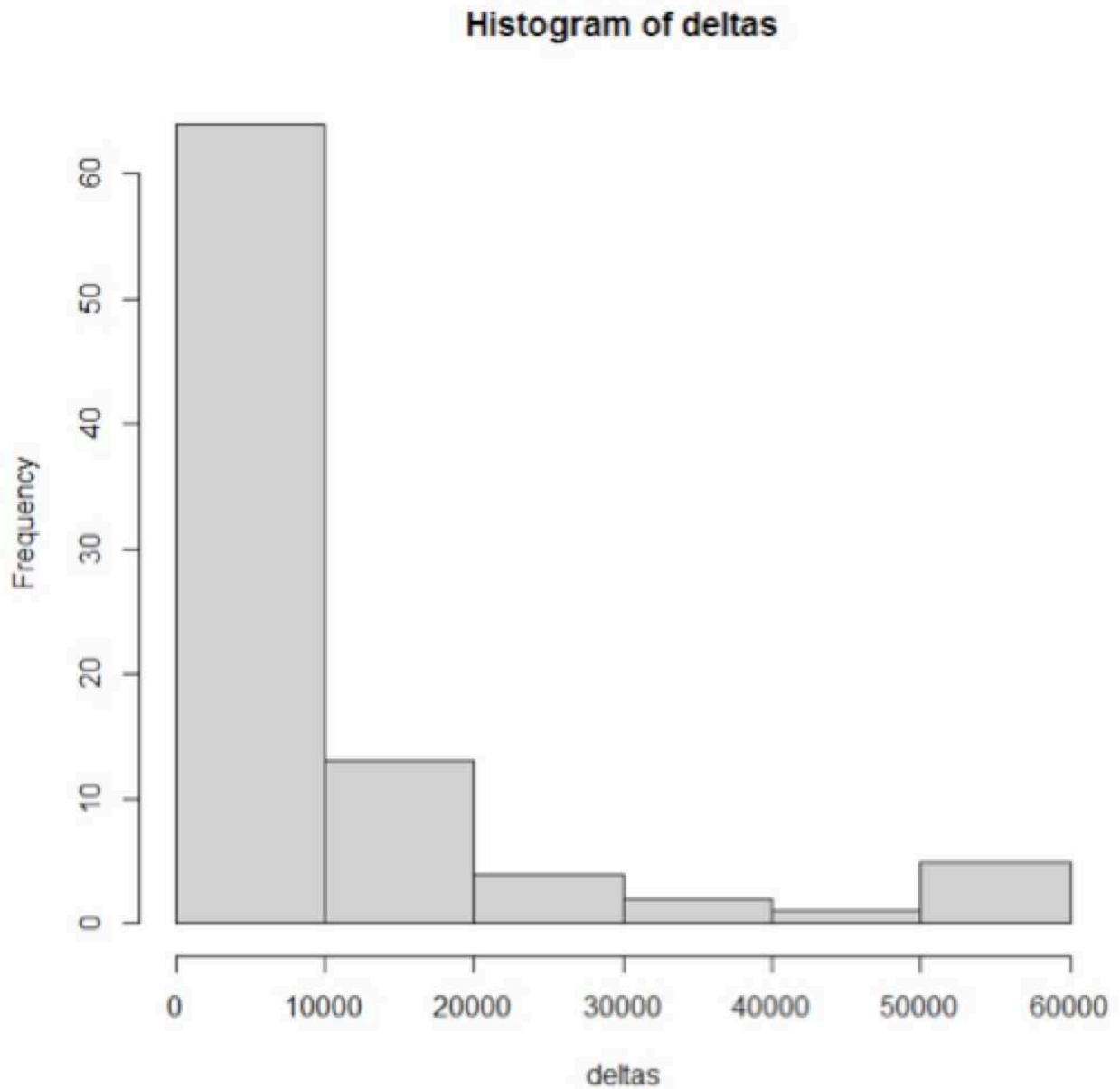


Figure 2. Histogram of deltas (increments between consecutive periods) of Biden counts

Randomly sampling from the distribution of increment sizes many times – a technique called “resampling” – and studying how much the sum of the increments varies across many random resampling scenarios provides one way to gain insight into whether the pattern seen in Figure 1 is unusual enough to indicate likely intervention. Figure 3 show the results of this statistical “bootstrapping” procedure for 10,000 randomly generated resampled (“bootstrapped”) samples from the original data.

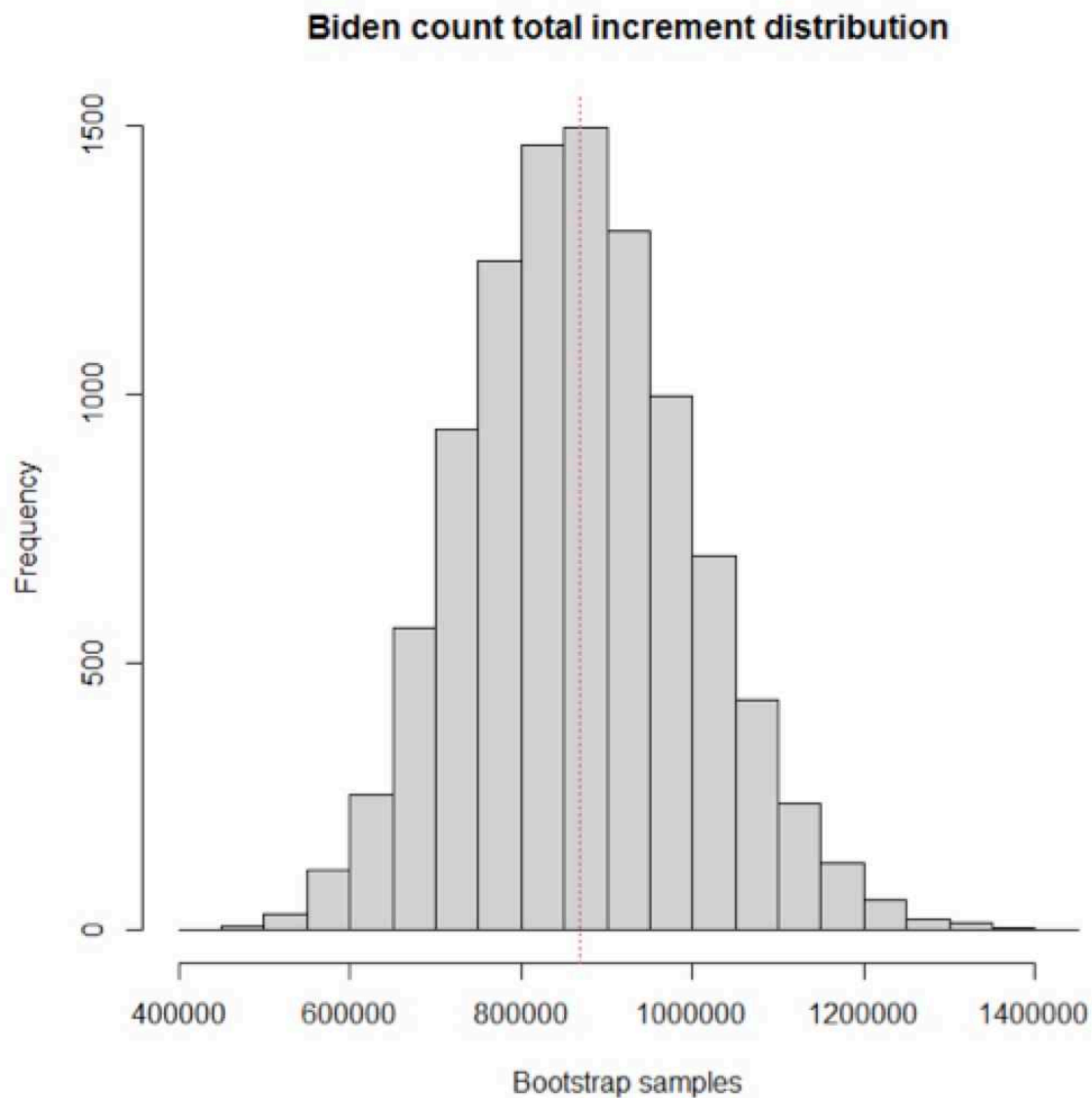


Figure 3. Resampling (using the “bootstrap” method) shows that the sum of 90 increments sampled from the frequency distribution of increments observed in the Biden count time series (see Figure 2) spans a relatively wide range (roughly 3-fold). This makes it unlikely that the time course of Biden counts would end up within 1% of a specific value (here, the Trump final count) by chance.

Figure 3 shows that the total increment in Biden counts over the three-day observation period (modeled as the sum of about 90 consecutive increments) could plausibly have fallen anywhere in a fairly wide range, from less than 600,000 to more than 1,200,000, given the frequency distribution of increment sizes reflected in Figure 2. The probability of the final value falling within about 1% (34,202) of the final Trump value by chance alone is very small.

Conclusion: These calculations deliberately ignore the time patterns in the data (see Figure 1) to focus instead on the variability in the data. Based on this variability, it is not probable that the final Biden count would end up being extremely close (within about 1%) of the final Trump count by chance alone. The two final counts would be expected to differ by more if third parties had no mechanism for tracking or adjusting the Biden counts to the Trump counts.

2 - Pennsylvania County Voting Anomalies

[S. Stanley Young](#), PhD, FASA, FAAAS

This report looks at Pennsylvania county voting, 2008 to 2020. The data set has 67 rows, with one row for each county. The first few rows are given here.

RowID	PA Counties	Obama 2008	Obama 2012	Clinton 2016	Biden2020F
1	Adams	17633	15091	14219	17919
2	Allegheny	373153	352687	367617	415737
3	Armstrong	11138	9045	7178	8352

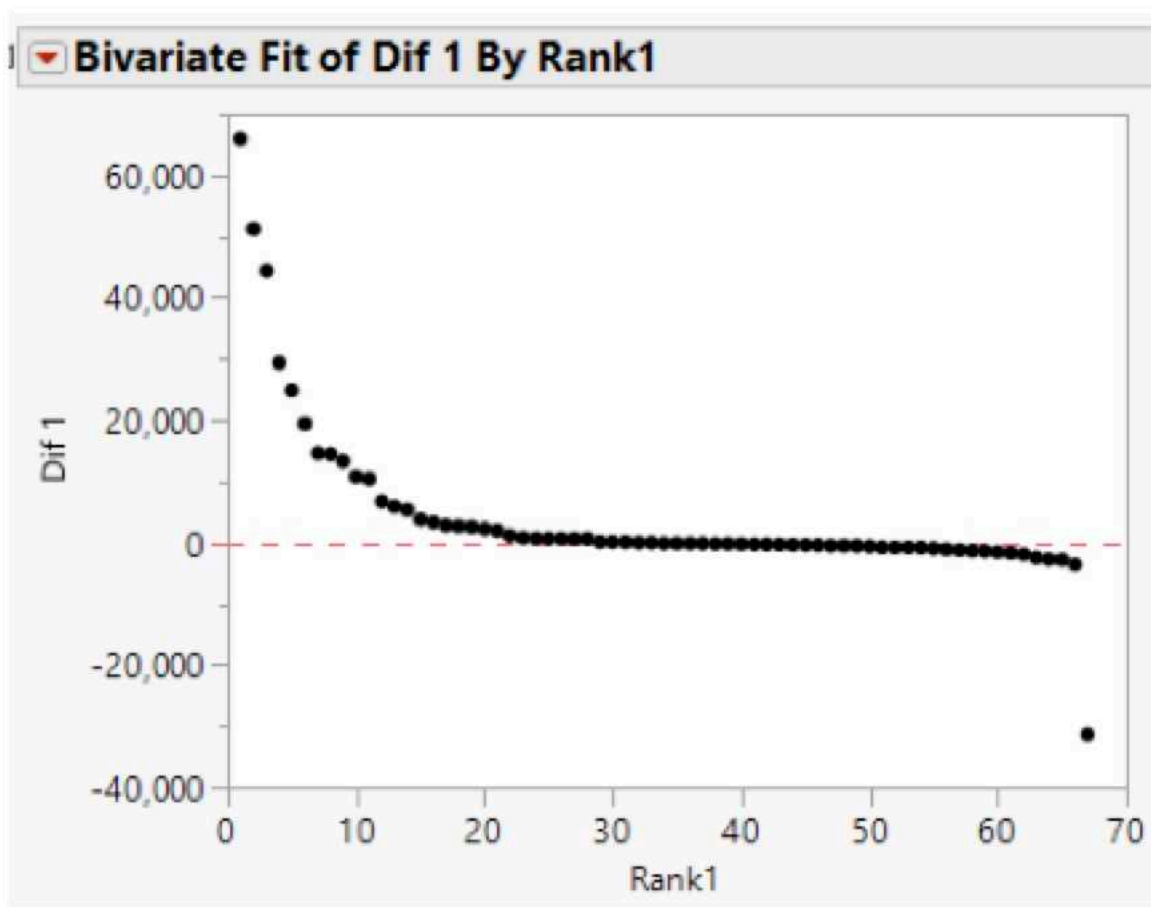
This report is in the form of text describing an item of interest with figures and tables along with discussion.

Summary:

- ∞ Philadelphia and Allegheny Counties are deviant in several respects including: they have high Democratic registration; they have a high percentage of voter turnout; the fraction voting changes dramatically from year to year; etc.
- ∞ The high vote for Biden counties are doubly unusual (i.e., are outliers) relative to previous presidential elections and relative to the remaining PA counties. Eleven such counties were identified. Together they report an excess of ~300,000 votes over expectation. The top five report about 216,000 votes over expectation. These increases in vote counts are statistically unusual, as most counties provide similar vote counts from Presidential election to Presidential election.
- ∞ Among the majority of PA counties, Biden's total was 70%± of registered Democratic voters. Among the ten anomaly counties (after elimination of Allegheny), Biden's total was 101%± of registered Democratic voters. That differential is highly suspicious.
- ∞ It makes sense to carefully evaluate the results for the 11 counties that have large increases in votes — i.e have an accurate recount. Attention should focus on the top five problematic PA counties.

Item 1 —

Given in the figure on the next page are the change in voting for Biden 2020 relative to the average of three previous presidential elections (I'm calling that Dif1). The differences are ranked and plotted against the size of this difference. The largest increase is on the left and the largest decrease is on the right.



On the righthand side of the figure we see there are some counties where Biden did not do as well as the average. (The rightmost data point is Philadelphia which is a special case and will be covered elsewhere.) Toward the center of the figure we see that there was essentially no change from Biden to the average. It is common for people and counties to vote rather consistently from year to year. At the left side of the figure we see a slight rise, Rank 12 to Rank $22\pm$, which is sort of a mirror image to the far right. The points from Rank 12 to Rank 66 are expected given the nature of voting – i.e., most people vote like they did last time.

The high values of vote counts, Ranks 1-11, on the left of the figure are substantially anomalous relative to the rest of the data. In the statistical literature they are called outliers – lying away from the body of the data. In these counties Biden did exceptionally well, while in majority of PA counties Biden did as expected (i.e., like previous elections). In some counties the Biden count is actually *lower* than previous Democratic presidential candidates. For 11 PA counties (the left most dots on the graph above, there are much larger increases in votes for Biden than are statistically expected.

Item 2 —

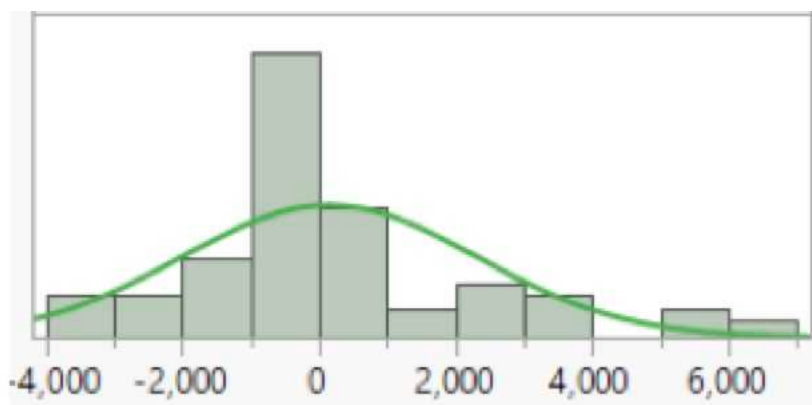
From the data in Item 1, the next page shows a list of the 11 outlier counties, where Montgomery County exhibits the most extreme statistical deviations.

PA Counties	Obama 2008	Obama 2012	Clinton 2016	Biden2020F	Dif 1	Rank1
Montgomery	253393	233356	256082	313543	65,932.7	1
Allegheny	373153	352687	367617	415737	51,251.3	2
Chester	137833	124311	141682	179065	44,456.3	3
Bucks	179031	160521	167060	198251	29,380.3	4
Delaware	178870	171792	177402	200911	24,889.7	5
Lancaster	99586	88481	91093	112536	19,482.7	6
Cumberland	48306	44367	47085	61168	14,582.0	7
Northampt...	75255	67606	66272	84145	14,434.0	8
Lehigh	87089	78283	81324	95539	13,307.0	9
Dauphin	69975	64965	64706	77387	10,838.3	10
York	82839	73191	68524	85323	10,471.7	11

As an example, consider Montgomery County. Obama/Hillary vote counts ranged from 233,000 to 256,000. Biden received 313,000. The eleven outlier counties together provide about 299,000 excess votes. The top five counties provide about 216,000 excess votes.

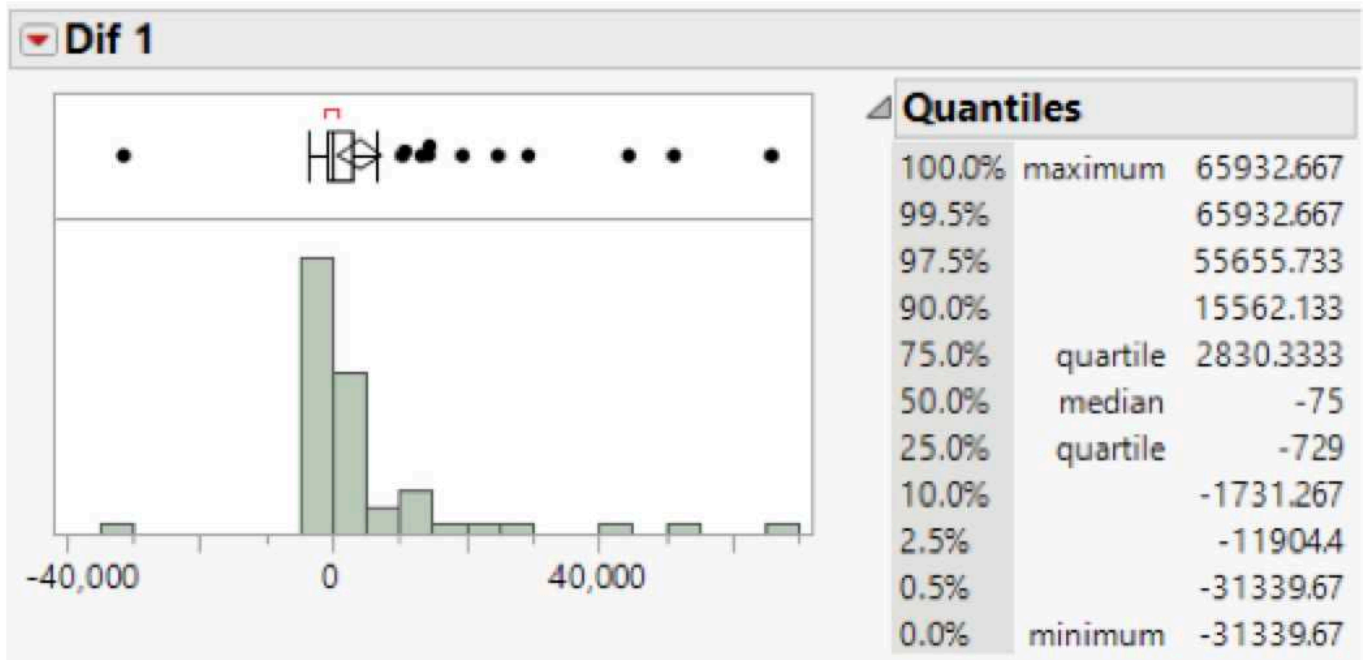
Item 3 —

The majority of PA counties (34) showed little change from previous presidential votes, i.e., little enthusiasm for Biden. We examine the bulk of the data, omitting for now those counties with a large increase, and Philadelphia in voting. We expect little change in the vote totals (DIF1) versus the average of previous votes and that is what we find for the bulk of the counties. In fact, there are more negative DIF1 values; note the large bar just below 0.



Item 4 —

We now look at the histogram for all the counties, including Philadelphia. (Philadelphia turned in $31,000 \pm$ votes less than in the average of the prior three presidential elections.)

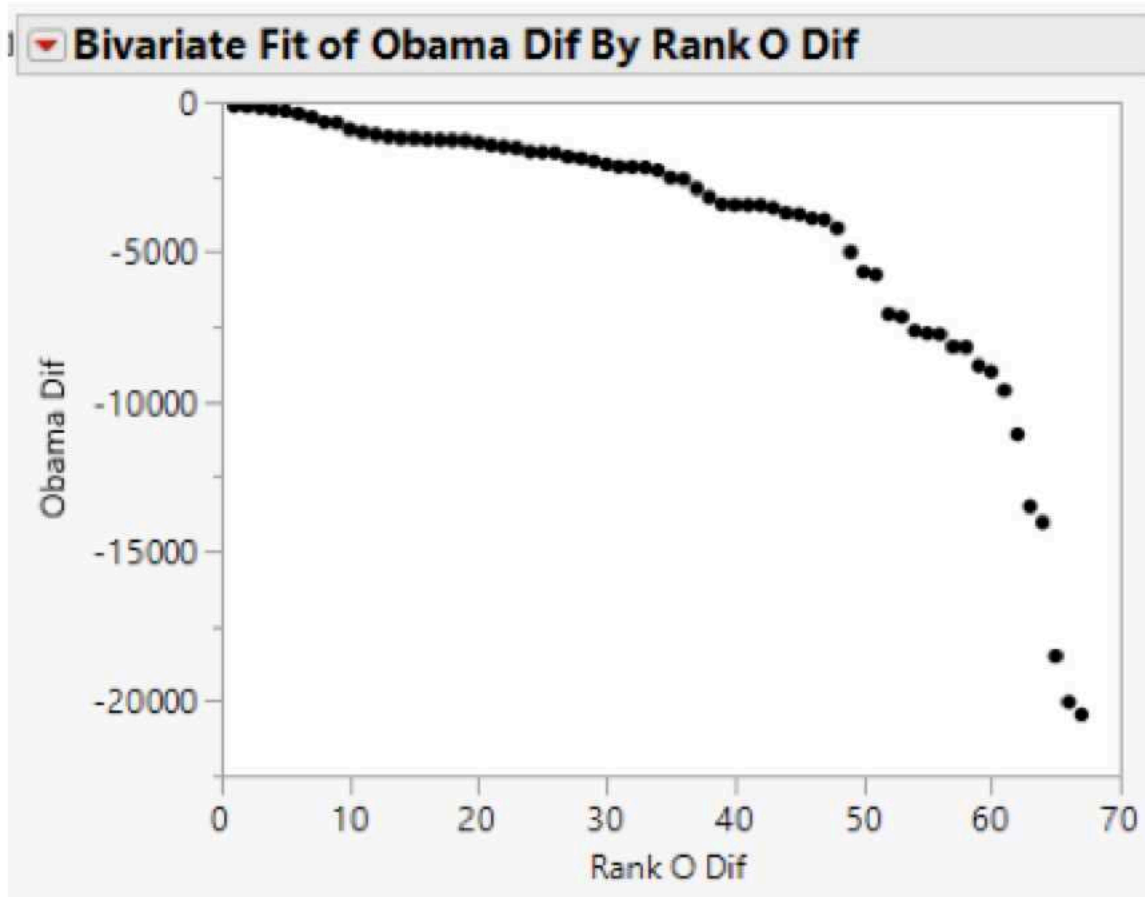


In the center of the figure, from -5,000 to about 6,000 we see bars that resemble a normal distribution; See Item 3. The values above 10,000 appear to be outliers. An outlier is an unusual number relative to other numbers in the collection. It is unusual to see a gain of 10,000 votes or more; reexamine Item 1.

Item 5 —

The changes in vote counts from Obama 2008 to Obama 2012 were mostly negative, give here as Obama Dif and is plotted against their ranks (next page). The votes for Obama were high in 2008. Most counties provided fewer votes in 2012, the down sloping set of points. At the end of this down-sloping drift, there are dramatic falls in vote counts, outliers of votes lost.

RowID	PA Counties	Obama 2008	Obama 2012	Obama Dif	Rank O Dif
6	Berks	97047	83011	-14036	64
9	Bucks	179031	160521	-18510	65
46	Montgomery	253393	233356	-20037	66
2	Allegheny	373153	352687	-20466	67



It is curious that many of the same counties, e.g., Montgomery and Allegheny, come up having large declines with Obama 2012, but having large increases with Biden 2020. These wild swings are extremely unusual as most counties, where voters vote similarly over time.

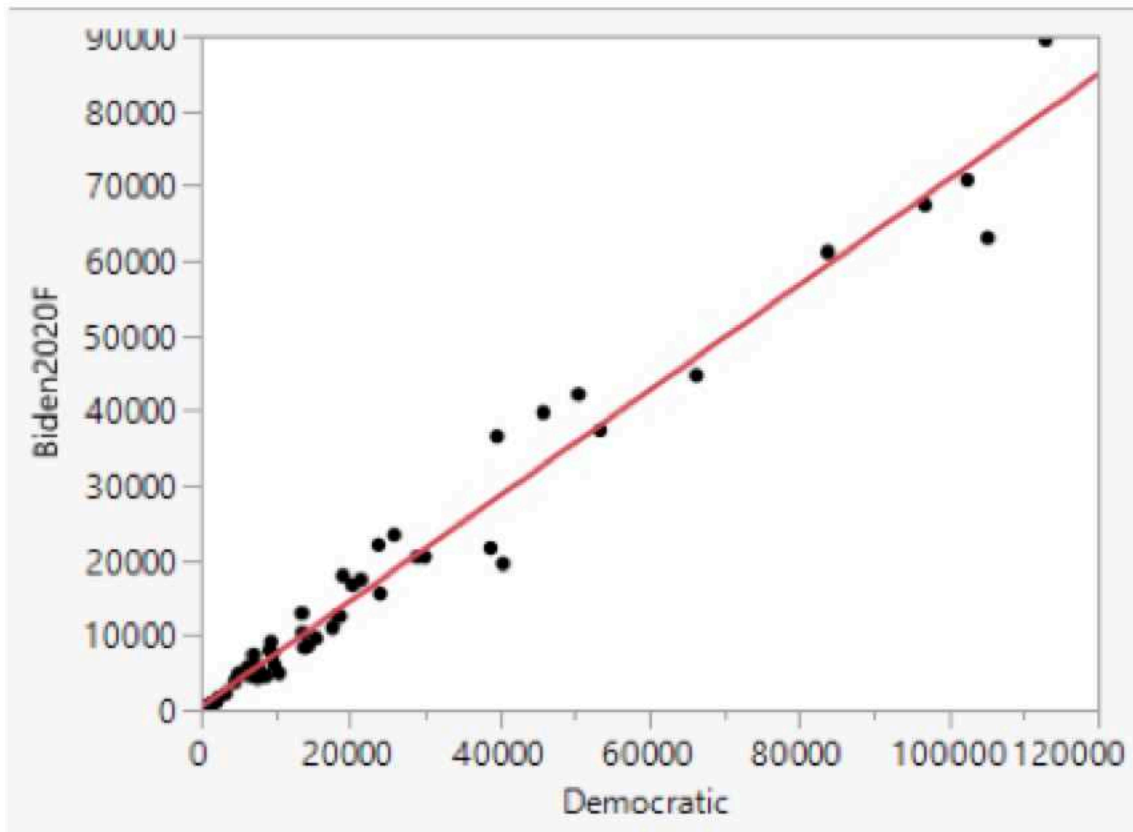
Item 6 —

We seek to estimate the fraction of registered Democratic voters that voted. We want an unbiased estimate, so the 11 outlier counties and Philadelphia were removed from the analysis. 55 PA counties were used for simple linear regression.

The data are fit well with a simple line (see next page)

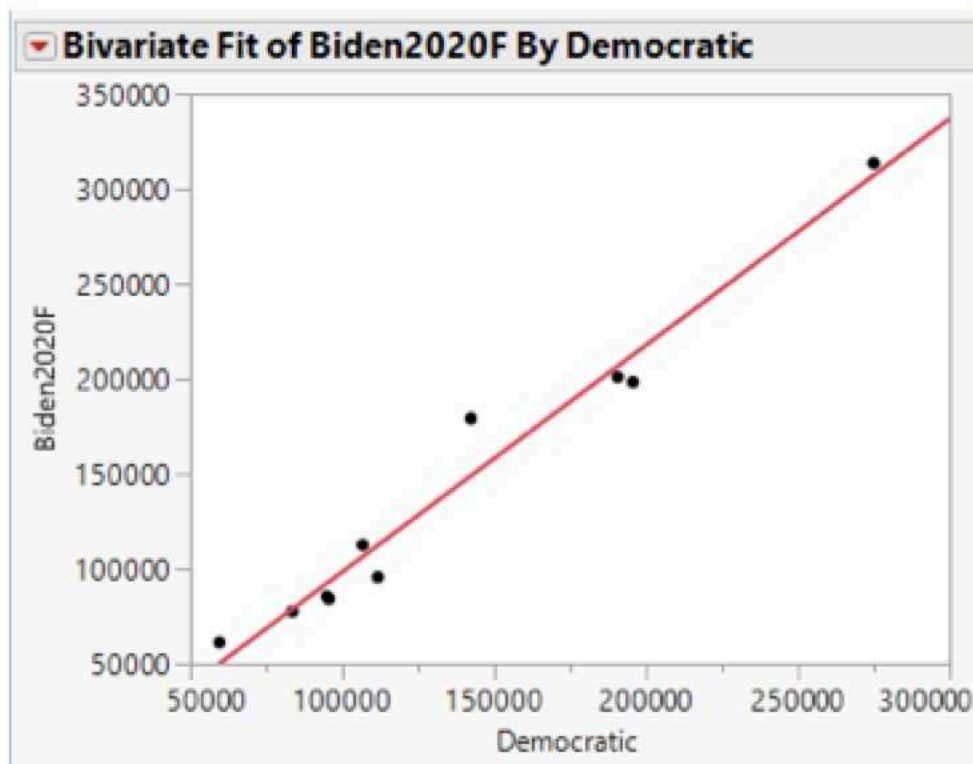
$$\text{Biden2020} = 439.8738 + 0.7036542 * \text{Democratic}$$

This means that we expect $70\% \pm$ of registered Democratic voters to vote in normal (the majority of) Pennsylvania counties.



Item 7 —

We seek to estimate the fraction of registered Democratic voters that voted among the outlier counties. We want an unbiased estimate, so we removed Allegheny and Philadelphia counties as they are rather unique. Ten counties were used for simple linear regression.



The data are fit well with a simple line (see prior page).

$$\text{Biden2020} = -21215.45 + 1.1943149 * \text{Democratic}$$

This means that the number of Biden votes in ten of the outlier counties was **101%±** of registered Democratic voters (vs the majority of other PA counties where it was **70%±** — an extraordinary statistical difference). That is not logical or reasonably explainable legally. The most likely explanation is that excess votes were added to the Biden total that did not come from voters.

Item 8 —

Our goal here is to estimate the expected relationship of Biden votes to the number of registered Democrats. There are non-problematic counties (55) and there are problematic counties (11 – 1 = 10). Note that Philadelphia and Allegheny counties are omitted. We also want to know the number of actual Biden votes per registered Democrat, separately for non-problematic and problematic counties. We use two methods of simple linear regression. More standard is the *Intercept Model* linear regression. In this method a line is placed through the data without constraint, the line can move and twist. Less standard is the *No Intercept* method. In this method the line is constrained to go through zero on the Y and X axes. Either method can make sense, so we present both. We focus on the slope of each of the four models, Intercept/No intercept, Non-problematic/Problematic. The slope indicates the number of Biden votes expected per registered **Democrat** voter. Here are the four slopes.

N	55	10
	Non-Problematic	Problematic
Intercept Model	0.7037	1.1943
No Intercept Model	0.7114	1.0654

First consider the 55 non-problematic counties. These are the counties where we did not find evidence of voting problems. The slopes for the two models are quite similar and indicate that **for every 100 increase of registered Democrat voters, there should be a 70± vote increase for Democrats.**

Both slopes for problematic counties are much larger and rather different from each other. That both are over 1.0 indicates that for every 100 registered Democrat voters there are more than 100 Democrat votes, which is quite improbable. The Intercept Model is **not** constrained to pass through 0,0 so it has more freedom to fit the data. Its slope is greater and indicates 119 Democrat votes are occurring for each 100 registered Democrats, again improbable.

The No Intercept Model is constrained to pass through the 0,0 point. With either model, the problematic counties give an improbable result, more Biden votes than there are *registered* (not voting) Democrat voters. Next, we compute the actual number of Biden votes per registered voter.

	Non-Problematic	Problematic
Actual votes per Reg Dem	72.8531	101.0012

We see that in non-problematic counties that an average of about 72 votes are obtained for each 100 registered voters, which comports with usual voter history. For problematic counties we get an average of 101 voters per 100 voters, which is quite unusual. It is instructive to see the actual data.

RowID	PA Counties	Biden2020F	Democratic	%Democrat
46	Montgomery	313543	274955	114.0
2	Allegheny	415737	555649	74.8
15	Chester	179065	142423	125.7
9	Bucks	198251	195772	101.3
23	Delaware	200911	190702	105.4
36	Lancaster	112536	106762	105.4
21	Cumberland	61168	59656	102.5
48	Northampt...	84145	95710	87.9
39	Lehigh	95539	111803	85.5
22	Dauphin	77387	83635	92.5
67	York	85323	95027	89.8

Item 9 —

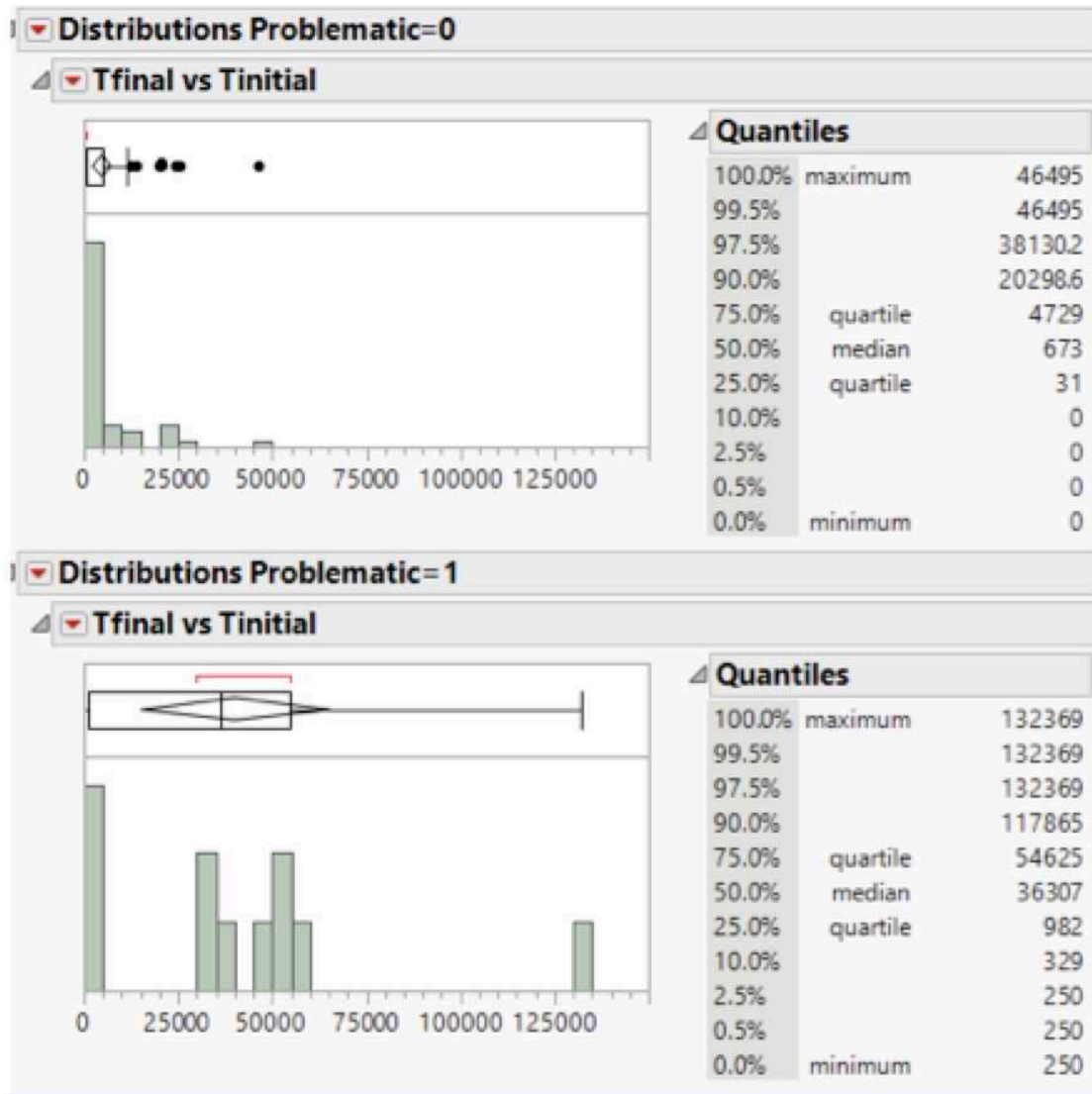
Vote counts were obtained for Wed, Nov 4 as well as the total counts. The difference between these is the number of mail-in votes. Here we examine the distribution of those votes between the eleven statistically suspicious (i.e., “problematic”) and non-problematic (55) Pennsylvania counties. (As explained above, Philadelphia is *not* included in the following analysis.)

A test of how many votes were added, from Wed, Nov 4 to end of counting, was computed for counties. **Many** more votes were added to the problematic counties compared to the non-problematic counties. “0” is non-problematic and “1” is problematic.

Non-problematic counties added a median of 673 votes per county.

Problematic counties added a median of 36,307 votes per county.

The number of mail-in votes in non-problematic counties can serve as a proxy for “voting/ business as usual”. Since the difference is substantial and well beyond chance, the mail-in vote for problematic counties can be taken as another indicator of suspect results.



Item 10 —

Down ballot results can be used to gain insight into the voting process. In some cases it has been reported that there were numerous ballots with *only* the Presidential choice checked off. This could indicate a large number of fabricated ballots, where it is too cumbersome to enter votes for the down ballot candidates. Voting for only one candidate is particularly suspicious for absentee votes, where the voter typically has plenty of time to consider all the candidates.

Some inconsistencies between presidential votes and down-ballot voting may point to systematic problems, which otherwise might remain unnoticed. In the Allegheny situation we have a suspicious situation: a Democrat down ballot candidate out polls the Presidential candidate. Take look at the table on the top of the next page (data can be found [here](#)):

	Biden (D)	Shapiro (D)		Trump (R)
Election Day	148,171	161,321		209,459
Absentee	274,774	273,725		67,164
Total	430,759	443,166		282,913

We have the 2020 Allegheny County total votes (Election Day and Absentee), for Biden, Shapiro and Trump. (Shapiro is the incumbent Democrat Attorney General, running for re-election.) In-person voting for Biden is low relative to Trump, but there is an offset by a massive number of Absentee votes. The devil is in the details.

Why should the Election Day votes for Biden be lower than for fellow Democrat Shapiro, esp when both are at the top of the ticket. If this means that Shapiro is more well-liked, then why wasn't a similar ratio continued with Absentee votes? Is this deviation likely to happen naturally? There are standard ways to evaluate chance¹ and the conclusion is that this result is very unlikely to occur naturally (chi-square of 42.3 with a p-value of 4×10^{-11}).

Here is some commentary:

1. If we start with the presumption that Biden/Shapiro Election Day vote counts are correct (non-manipulated), then the Biden/Shapiro Absentee vote counts are a discrepancy, not explainable by chance.
2. The Election Day votes indicate that Biden is not as popular as Shapiro. One possible conclusion as to why that the Biden/Shapiro ratio was not maintained in Absentee Ballots, is that some Absentee votes were taken from Trump and given to Biden. (If we look at how many Absentee votes Biden would have been expected to get to maintain the same Biden/Shapiro ratio as on Election Day, we see that he has $23,000 \pm$ votes more than that.) If not taken from Trump, did they come from other manipulations? Or did Absentee voting Democrats just have a very different perspective from Election Day Democrats?

Summary of Item #10:

This Biden/Shapiro discrepancy is not explainable by chance, between the voting patterns of Election Day and Absentee ballots. This suggests the possibility of either vote dumping to Biden and/or vote switching from Trump to Biden.

¹Election Day / Absentee by Biden/Shapiro was analyzed with SAS JMP software.

3 - Statistical Voting Analysis in the Pennsylvania 2020 Presidential Election Montgomery and Allegheny Counties

(Condensed Version)

Dr. Eric Quinnell 11/30/20

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Executive Summary

Analysis – A team of unpaid citizen volunteer mathematicians, scientists, and engineers collaborated in a statistical vote analysis in the Pennsylvania 2020 Presidential Election. Using simple linear regression of unproblematic voting districts, we predict hypothetically problematic voting districts. Using distributional characteristics within problematic counties, we point to problematic districts and precincts.

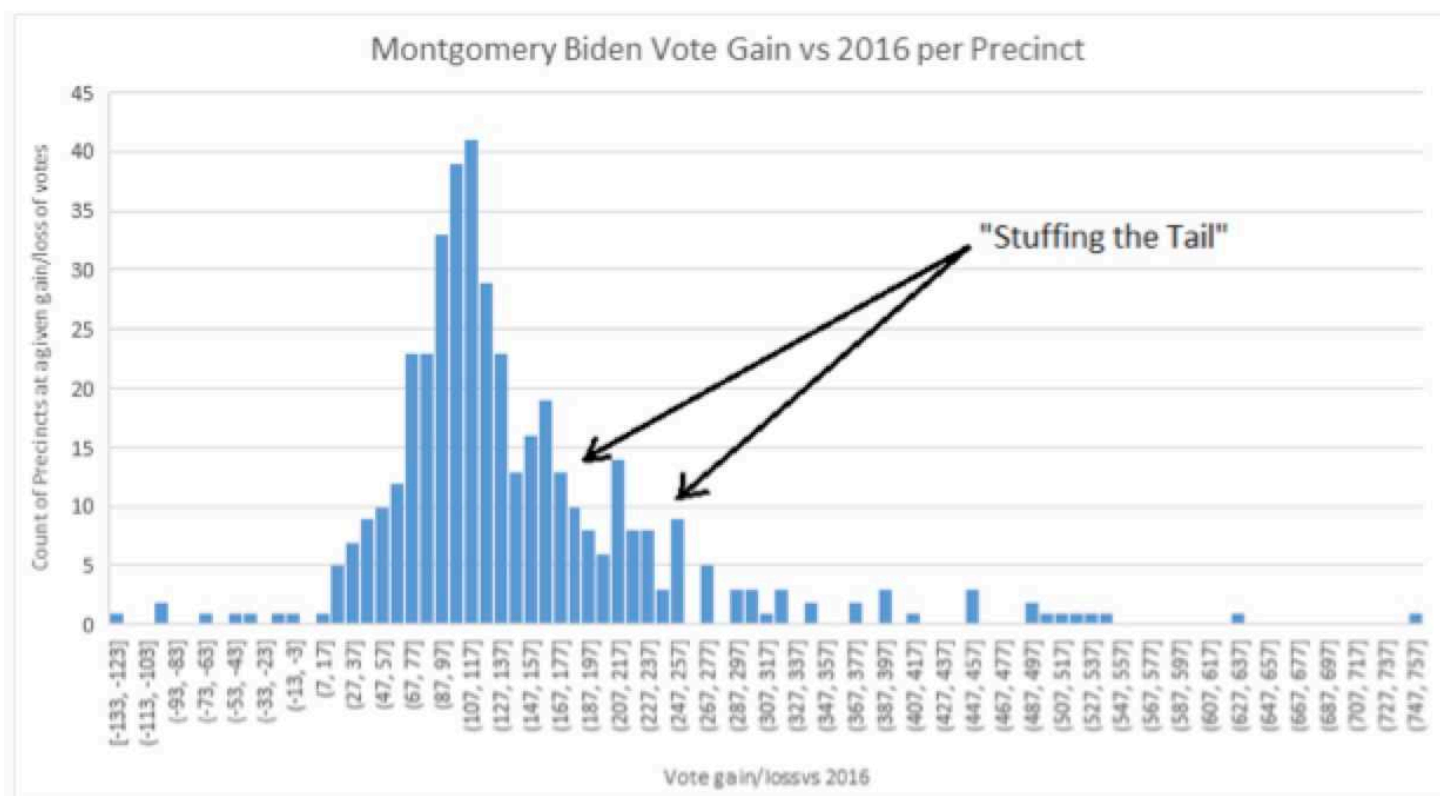
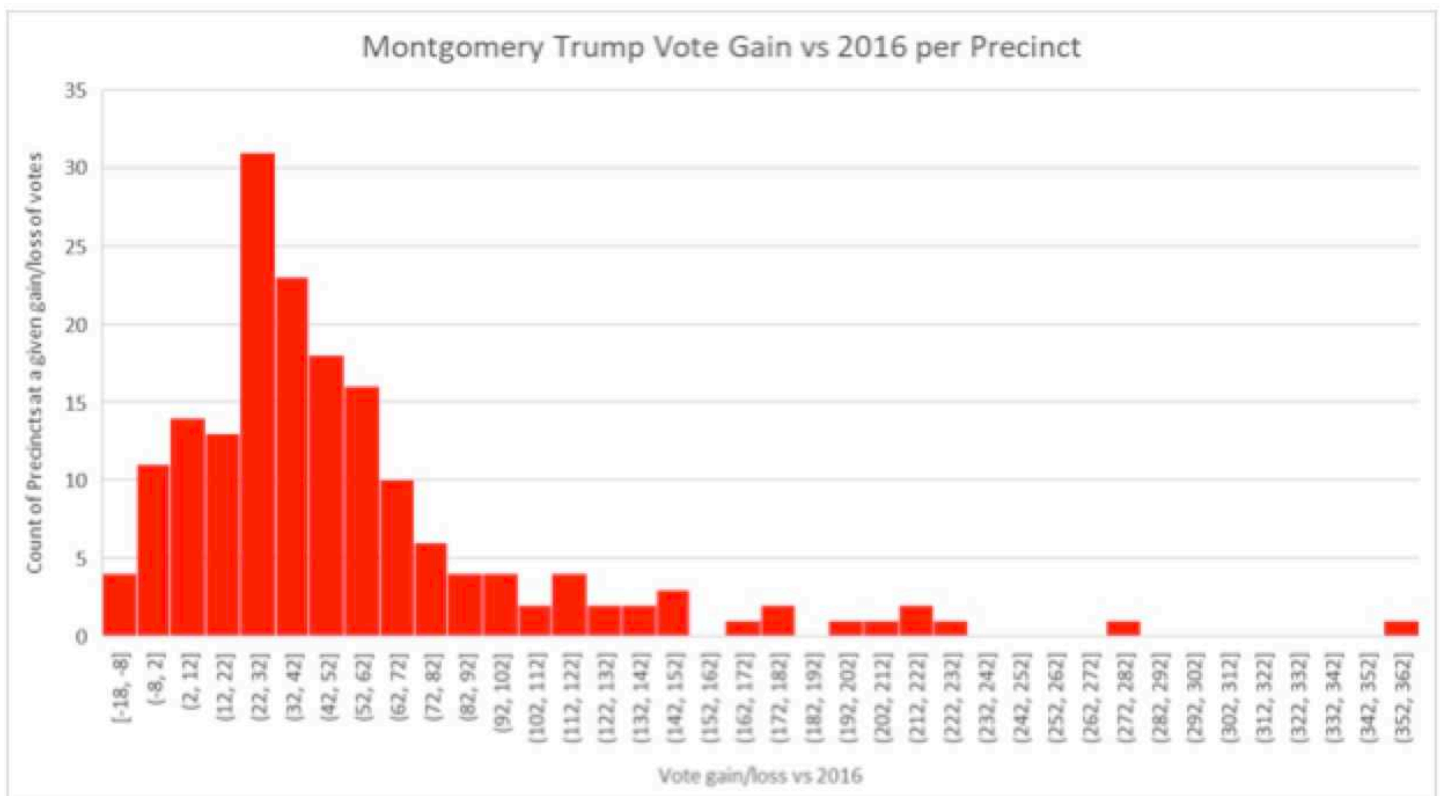
Findings – Montgomery and Allegheny Counties stand out as problematic in our analysis. Montgomery and Allegheny show some 27,000 and 30,500 excessive votes above historical patterns, respectively. These anomalies, coupled with extremely high turnouts of 77-84% (significantly higher than heavily democratic cities like Philadelphia with 63% turnout and Atlanta with 65% turnout) suggested deeper analysis into both.

Problematic districts and precincts within these counties exhibit unusual Democrat to Republican ratios as compared to their history. Additionally, some precincts show an excessive number of votes in favor of candidate Joseph Biden sometimes even exceeding new voter registrations.

Montgomery County

A differential analysis of votes gained over 2016 totals for both Trump and Biden in Montgomery County (data below) produces the distribution curves for both candidates on the next page.

<i>Trump Votes Diff vs 2016</i>		<i>Biden Votes Diff vs 2016</i>	
Per Precinct		Per Precinct	
MEAN	50.5	MEAN	143.3
STDDEV	63.7	STDDEV	99.9
SKEW	4.1	SKEW	2
KURT	37.9	KURT	7



Visually and quantitatively, this says that Trump gained roughly 50 votes per precinct above 2016 in a moderately spread distribution, with a very long tail with an unusually high skew leaning in the positive (vote gain) direction. ... The Biden distribution tends to say roughly the same lean to the right, but with a much higher average. Visually, the right tail shows unusual binning (called “stuffing the tail” – an anomaly seen in the 2008 sub-prime mortgage crisis) which is visually apparent. Trump’s tail has a hint of tail stuffing as well, but on a lower magnitude.

Quantitatively Biden gained 143 votes per precinct above 2016 with a larger spread, yet less heavily leaning skew and smaller tail. Both distributions have some extremes well outside their 3-sigma range, which from the data looks like some sort of redistricting in a few precincts.

Looking at the comparative averages of both distributions, Montgomery County shows a new vote distribution well outside the 2016 norm. Specifically, both candidates achieved the total 2016 vote count and added to their sums, consistent with new turnout. What's curious is that above the 2016 totals, a new vote ratio appears in contrast to the voting history of the area – showing new voters going 74% Democrat vs 26% Republican – a 13-point gain for Democratic new voters above their recent history. This means for every new Trump voter over 2016, there were 2.8 new Biden voters above 2016.

Gained Votes over 2016 <u>Avg</u> per Ward	
<i>Trump</i>	50.5
<i>Biden</i>	143.3
<i>Diff</i>	
<i>2020 D/R Gain Ratio</i>	2.84
<i>%</i>	74D / 26R
<i>2016 D/R Historical Ratio</i>	1.57
<i>%</i>	61D / 39R

Voting totals of precincts may presume to follow a semi-normal distribution with enough data points. By fitting a normal distribution to actual data and taking the difference between the fitted and actual, potentially anomalous precincts can be identified. The Montgomery results currently look like this:

2020	Register	Voted	Biden	Trump	D/R
	609,250	511,125	318,041	184,668	1.72
<i>turnout</i>	84%	share	62.2%	36.1%	

Using a per-precinct history, we can take this result and make the following prediction that is in line with voter history per-precinct without statistically anomalous deviations:

Total Predicted 2020	Register	Voted	Biden	Trump	D/R	Excess Votes
	609,250	495,307	290,781	184,668	1.57	27,276
<i>turnout</i>	72%		58.6%	41.4%		

This prediction helps us identify several precincts in Montgomery County that significantly stick out – specifically in places already deeply Democrat.

As an example of the excess vote gains above the norm, consider the district of Upper Dublin – a district that was already heavily Democrat voted 68D / 32R in the 2016 election. Every precinct significantly outperforms its history by adding on average 114 new Biden votes per ward, which is adding 13% more turnout of the entire district vs 2016 for just Biden alone. Biden takes on average 98% of the new vote in Upper Dublin, and most surprisingly, 231% of new registrations. Specifically, Biden gains 2,173 new votes over 2016 against Trump’s 393 new votes, gaining 5.5 new voters for every 1 new Trump voters. The new population of voters show a ratio of 86 D / 14R, which for the new voters is a 38-point swing toward Biden as compared to just 4 years ago.

2016					2020 Gains							
Upper Dublin	Trump	Clinton	Total	Registered	D/R	Trump	Biden	Total	Registered	dD/R	Dem % of new vote	Dem % of new registered
1,1	215	457	701	859	2.1	8	120	113	62	15.0	106%	194%
1,2	234	499	765	963	2.1	32	103	117	69	3.2	88%	149%
1,3	259	495	808	1038	1.9	28	96	92	-6	3.4	104%	N/A
2,1	291	463	798	1002	1.6	-1	106	79	2	N/A	134%	5300%
2,2	215	378	615	751	1.8	0	107	91	26	N/A	118%	412%
2,3	271	702	999	1275	2.6	7	116	114	26	16.6	102%	446%
3,1	335	867	1236	1501	2.6	70	250	304	234	3.6	82%	107%
3,2	344	507	895	1105	1.5	58	117	157	64	2.0	75%	183%
4,1	242	346	616	748	1.4	30	119	137	108	4.0	87%	110%
4,2	192	698	924	1116	3.6	33	92	108	69	2.8	85%	133%
4,3	250	512	789	1010	2.0	-2	132	113	10	N/A	117%	1320%
5,1	182	496	706	884	2.7	27	92	103	65	3.4	89%	142%
5,2	268	616	927	1126	2.3	24	90	84	34	3.8	107%	265%
5,3	220	660	919	1091	3.0	42	97	120	67	2.3	81%	145%
6,1	401	989	1430	1780	2.5	-1	135	115	0	N/A	N/A	N/A
6,2	334	519	893	1057	1.6	24	118	118	40	4.9	100%	295%
7,1	313	484	828	1019	1.5	26	99	107	49	3.8	93%	202%
7,2	311	483	820	1020	1.6	1	87	74	5	87.0	118%	1740%
7,3	168	482	677	867	2.9	-13	97	68	18	N/A	143%	539%
Ward	Trump	Clinton	Total	Registered	D/R	Trump	Biden	Total	Registered	dD/R	Dem % of new vote	Dem % of new registered
TOTAL	5045	10653	16346	20212	2.1	393	2173	2214	942	5.5	98%	231%
				2016 Dem/Rep	68D / 32R				2020 Gain Dem/Rep	85D / 15R		

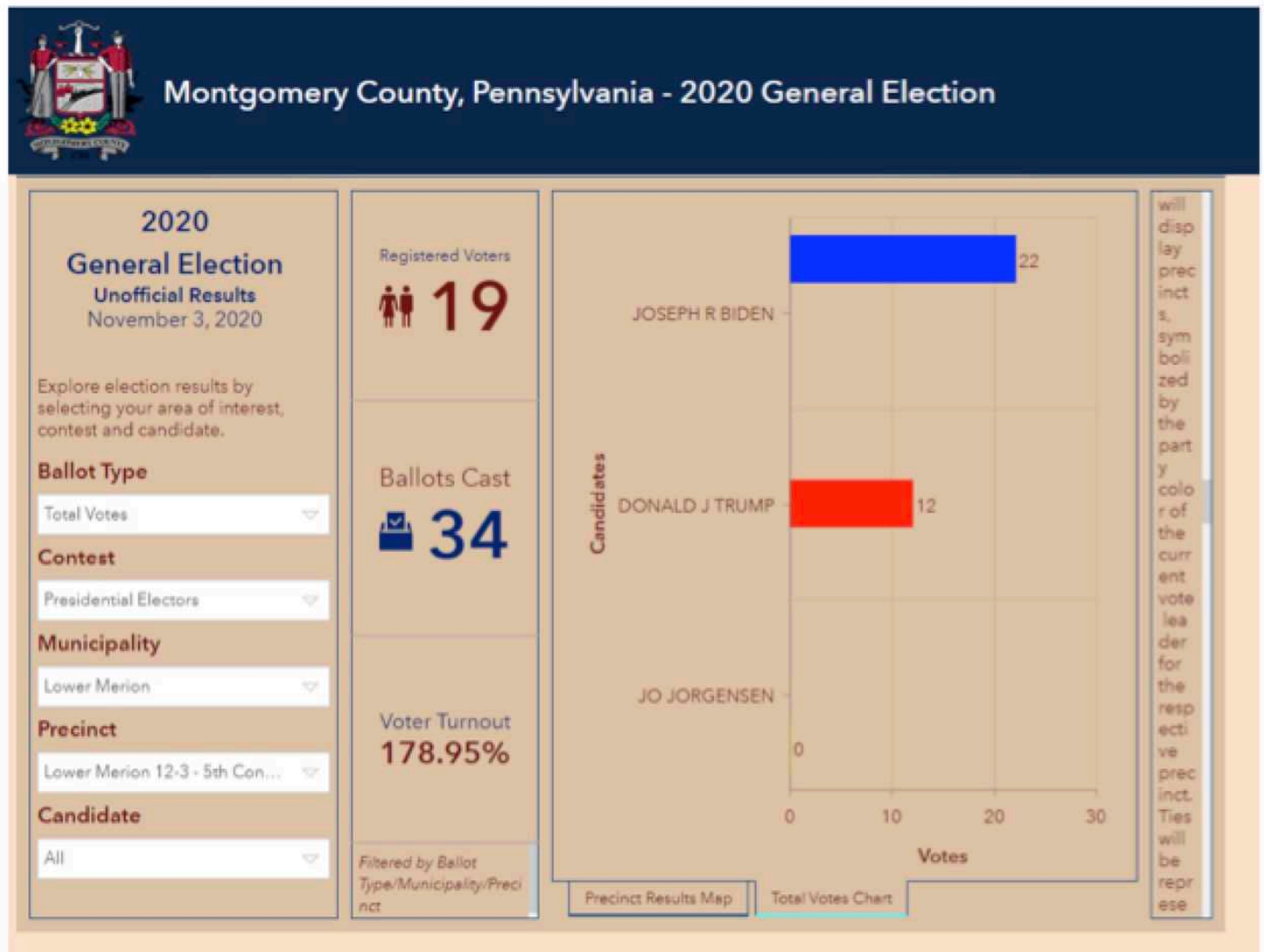
Checking the prediction – Lower Merion 12-3

Early in the development of the tool that does a linear regression per-precinct to re-normalize the local vote to recent voting history, we wanted to do some sanity checks on the outputs. While larger precincts represent most of the movement of the predictor, some very small precincts stuck out as well. Near the bottom of the list of the predicted simulation sat a very small precinct declaring itself to be almost double the registered size.

Predicted Total		
	Precinct	Excess Count
<i>Lower Merion</i>	12,3	11

This result was rather thrilling as when gathering data from the Montgomery County, Pennsylvania official clerk website, we had already found a result much like that.

The following screenshot was taken 11/14/2020 (and was still there 12/2/2020!) on the Montgomery County results website. The screenshot shows this sub district having 15 votes in excess of all registered voters. Thus, confidence in our predictive model was greatly increased by correctly pointing to what seems to be some kind of mistake. *The excess votes are those matching the absentee ballots for the precinct.*

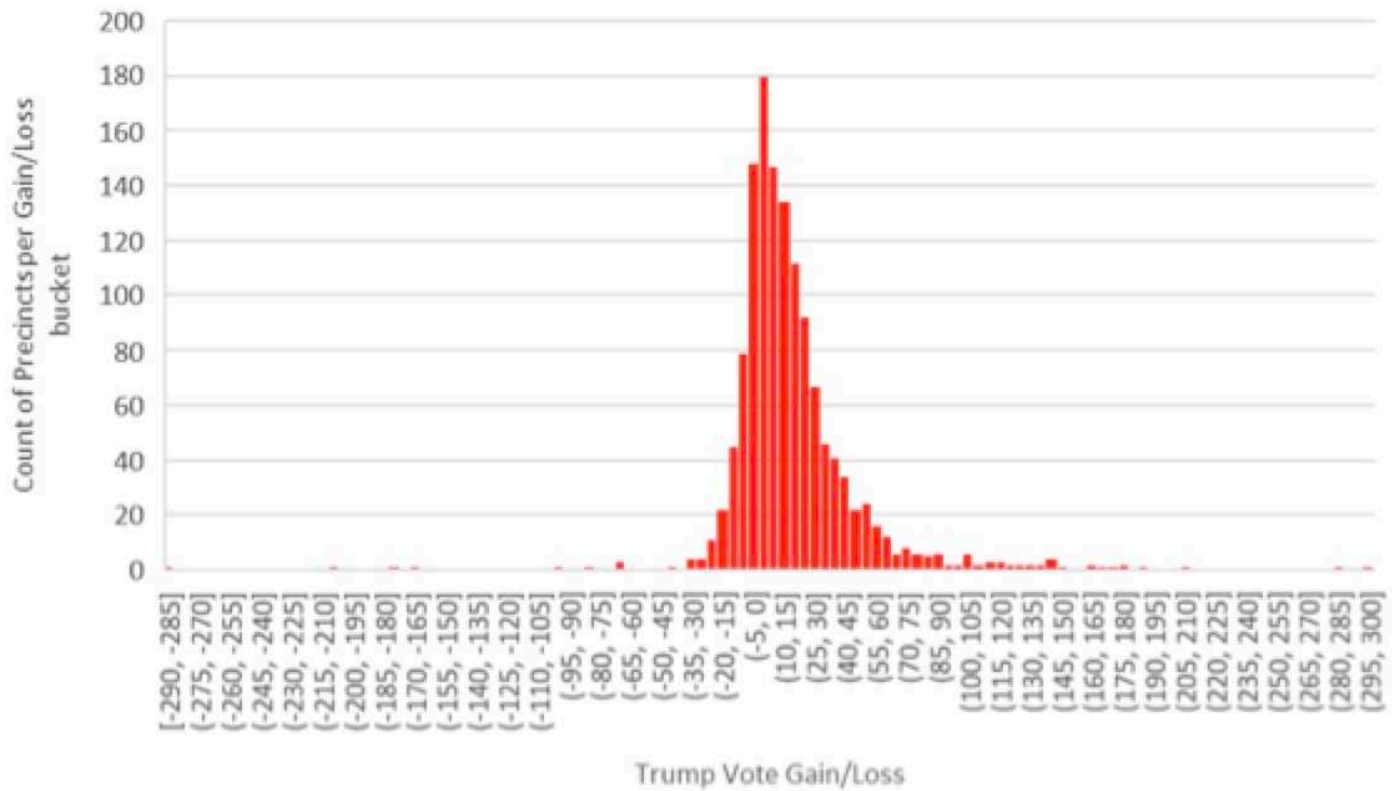


Allegheny County

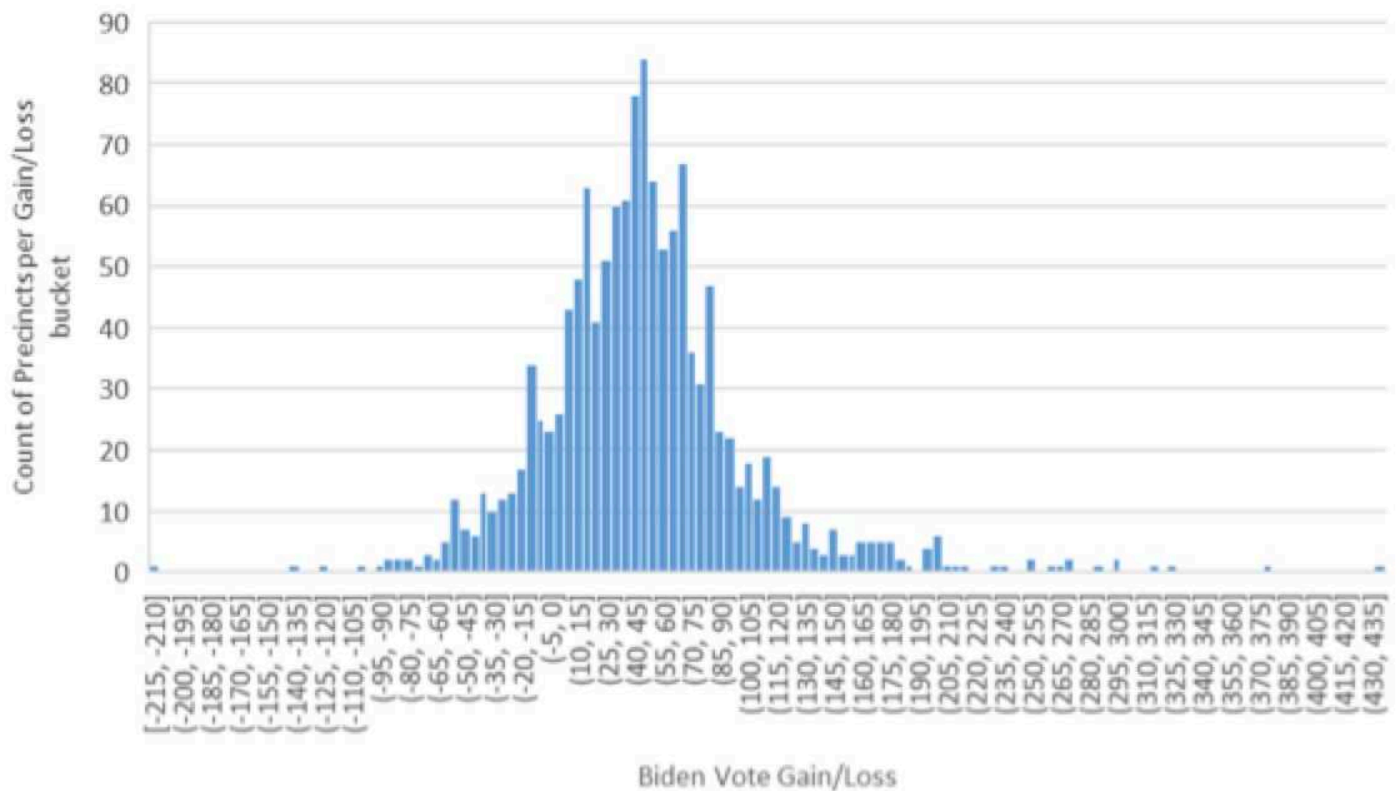
A differential analysis of votes gained over 2016 totals for both Trump and Biden in Allegheny County (data below) produces the distribution curves for both candidates on the next page.

Trump Votes Diff vs 2016		Per Precinct	Biden Votes Diff vs 2016		Per Precinct
MEAN		17.0	MEAN		46.5
STDDEV		33.4	STDDEV		64.8
SKEW		1.17	SKEW		-2
KURT		18.7	KURT		31.5

Allegheny Trump Vote vs 2016 per Precinct



Allegheny Biden Vote vs 2016 per Precinct



Visually and quantitatively, this says that Trump gained $17 \pm$ votes per precinct above 2016 in a very tight distribution, with a long tail leaning in the positive (vote gain) direction. The Biden distribution says something different – visually, unusual binning (“tail stuffing” effect) occurs on both sides of the distribution. Quantitatively Biden gained $46 \pm$ votes per precinct above 2016 with a larger spread and tail. What’s most curious is that the skew of the distribution is negative 2 – meaning it leans left pretty heavily (vote loss).

Looking at the comparative averages of both distributions, Allegheny County shows a new vote distribution well outside the 2016 norm. Specifically, both candidates achieved the total 2016 vote count and added to their sums, consistent with new turnout. What’s curious is that above the 2016 totals, a new vote ratio appears in contrast to the voting history of the area – showing new voters going 73% Democrat vs 27% Republican – a 14-point gain for Democratic new voters above their recent history. This means for every new Trump voter over 2016, there were 2.7 new Biden voters above 2016.

Gained Votes over 2016 Avg per Ward

<i>Trump</i>	17
<i>Biden</i>	46.5
<i>Diff</i>	29.4
<i>2020 D/R Gain Ratio</i>	2.73
<i>%</i>	73D / 27R
<i>2016 D/R Historical Ratio</i>	1.42
<i>%</i>	59D / 41R

Voting totals of precincts may presume to follow a semi-normal distribution with enough data points. By fitting a normal distribution to actual data and taking the difference between the fitted and actual, potentially anomalous precincts can be identified. The Allegheny results currently look like this:

2020	Register	Voted	Biden	Trump	D/R
	942,851	722,145	428,876	282,170	1.52
<i>turnout</i>	77%	share	59%	39%	

Using a per-precinct history, we can take this result and make the following prediction that is in line with voter history per-precinct without statistically anomalous deviations:

<i>Total Predicted 2020</i>	Register	Voted	Biden	Trump	D/R	Excess Votes
	942,851	681,522	399,341	282,170	1.42	30,518
<i>turnout</i>	72%		58.6%	41.4%		

This prediction helps us identify several precincts in Allegheny County that significantly stick out – specifically in places where the prediction indicates Biden was losing votes, and excess votes are calculated to stem those natural losses.

As an example of the excess vote gains above the norm, consider the district of McCandless – a district that voted 48D / 52R in the 2016 election. Every ward significantly out performs its history by adding on average 108 new Biden votes per ward, which is adding 13% more turnout of the entire district vs 2016 for just Biden alone. Biden takes on average 115% of the new vote in McCandless and 296% of the new registrations. Specifically, Biden gains 2,275 new votes over 2016 against Trump’s 361 new votes, gaining 6.3 new voters for every 1 new Trump voters. The new population of voters show a ratio of 86 D / 14R, which for the new voters is a 38-point swing toward Biden as compared to just 4 years ago.

2016						2020 Gains									
Ward	Trump	Clinton	Total	Registered	D/R	Trump	Biden	Total	Registered	dD/R		Dem % of new vote	Dem % of new registered		
MCCANDLESS WARD 1 DIST 1	466	349	856	1097	0.7	9	135	121	51	15.0		112%	265%		
MCCANDLESS WARD 1 DIST 2	266	327	620	931	1.2	-30	34	-15	-126	N/A		N/A	N/A		
MCCANDLESS WARD 1 DIST 3	435	385	877	1240	0.9	53	120	131	48	2.3		92%	250%		
MCCANDLESS WARD 2 DIST 1	488	512	1067	1407	1.0	16	157	117	15	9.8		134%	1047%		
MCCANDLESS WARD 2 DIST 2	362	285	697	857	0.8	26	95	77	31	3.7		123%	306%		
MCCANDLESS WARD 2 DIST 3	347	311	689	875	0.9	22	62	69	15	2.8		90%	413%		
MCCANDLESS WARD 3 DIST 1	356	360	762	943	1.0	-4	81	44	27	N/A		184%	300%		
MCCANDLESS WARD 3 DIST 2	437	383	865	1071	0.9	24	76	67	27	3.2		113%	281%		
MCCANDLESS WARD 3 DIST 3	437	358	848	1038	0.8	71	105	140	89	1.5		75%	118%		
MCCANDLESS WARD 4 DIST 1	631	492	1203	1507	0.8	-1	175	116	25	N/A		151%	700%		
MCCANDLESS WARD 4 DIST 2	353	316	715	921	0.9	22	103	91	37	4.7		113%	278%		
MCCANDLESS WARD 4 DIST 3	305	264	615	731	0.9	6	76	55	15	12.7		138%	507%		
MCCANDLESS WARD 5 DIST 1	377	261	672	816	0.7	12	70	56	42	5.8		125%	167%		
MCCANDLESS WARD 5 DIST 2	473	450	965	1341	1.0	44	135	153	73	3.1		88%	185%		
MCCANDLESS WARD 5 DIST 3	332	374	746	943	1.1	21	111	104	64	5.3		107%	173%		
MCCANDLESS WARD 6 DIST 1	194	168	391	485	0.9	10	48	33	3	4.8		145%	1600%		
MCCANDLESS WARD 6 DIST 2	448	343	833	1018	0.8	1	119	95	39	119.0		125%	305%		
MCCANDLESS WARD 6 DIST 3	646	626	1338	1763	1.0	10	273	252	155	27.3		108%	176%		
MCCANDLESS WARD 7 DIST 1	567	536	1153	1588	0.9	55	146	175	79	2.7		83%	185%		
MCCANDLESS WARD 7 DIST 2	397	368	810	973	0.9	-9	100	60	45	N/A		167%	222%		
MCCANDLESS WARD 7 DIST 3	200	196	421	514	1.0	3	54	40	15	18.0		135%	360%		
Ward	Trump	Clinton	Total	Registered	D/R	Trump	Biden	Total	Registered	dD/R		Dem % of new vote	Dem % of new registered		
TOTAL	8517	7664	17143	22059	0.9	361	2275	1981	769	6.3		115%	296%		
				2016					2020 Gain						
				Dem/Rep	48D / 52R				Dem/Rep	86D / 14R					

4 - Strangely Synchronized Allegheny County Absentee Ballots

(Condensed Version)
Dr. Eric Quinnell 12/2/20

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Executive Summary

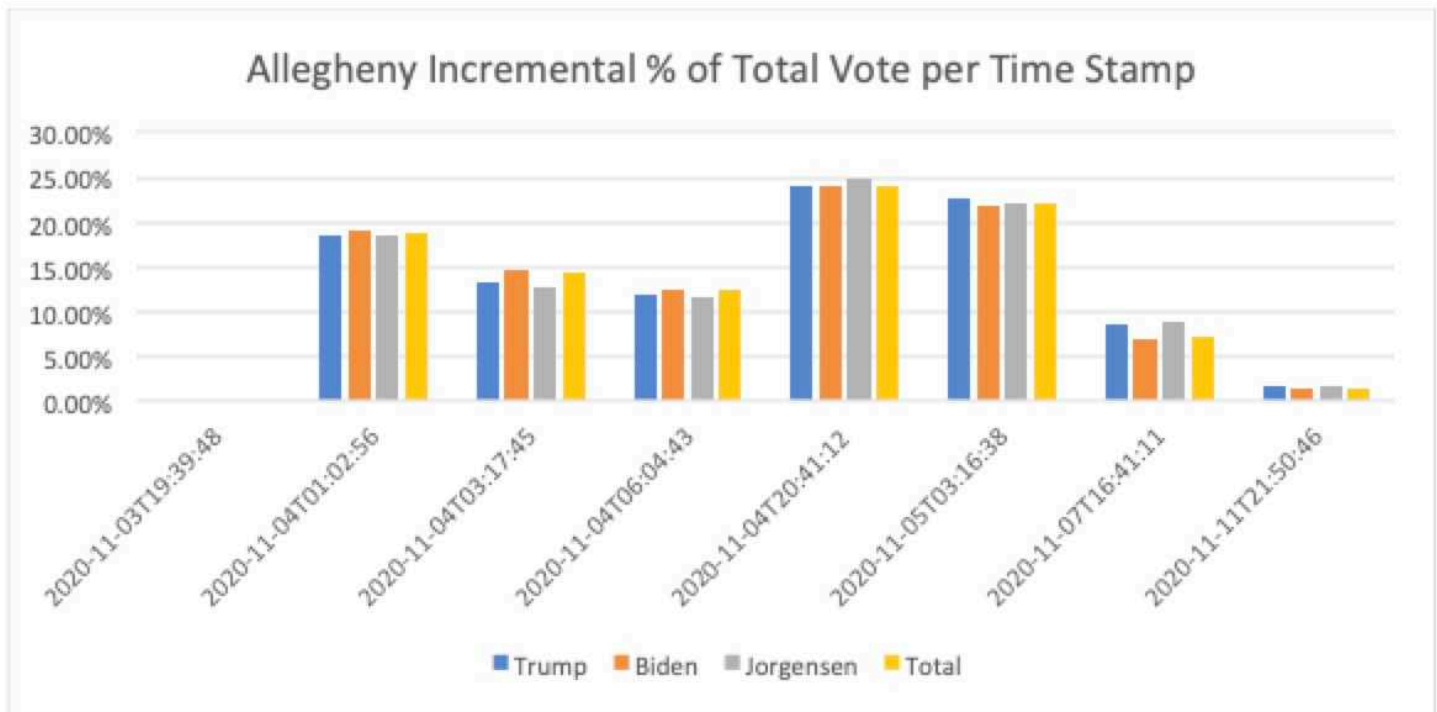
Analysis – A team of unpaid citizen volunteer mathematicians, scientists, and engineers collaborated in a statistical vote analysis in the Pennsylvania 2020 Presidential Election. After a static analysis, the group did extra work on time-series data provided by various sources of Edison time-series snapshots at a precinct level.

Findings – Allegheny county stands out as problematic in our static analysis, so it was a fine selection for time-series study. The results of the Allegheny time-series incremental absentee votes defy reality in a perfectly synchronous fashion – with all 1,300 precincts and candidates marching perfectly in time toward their eventual total of 340,000 absentee votes – not deviating in time nor in total share of each incremental count, regardless of how many or how few timestamps are used to break apart the count. Surely this cannot be...

Lockstep Totals Per Timestamp

When analyzing Edison time series data (non-NYT scraped, so stable with no negative votes) a curious discovery was made in the Allegheny absentee ballot updates over time. While there are many timestamps, any selection of those timestamps –whether using many or a few – show perfect lockstep updates toward their eventual Nov 11th total. This holds perfectly true for all three candidates, with no timestamp breaking the mold.

Consider eight timestamps selected in Allegheny, with each timestamp showing the percent of eventual final total per candidate (next page):



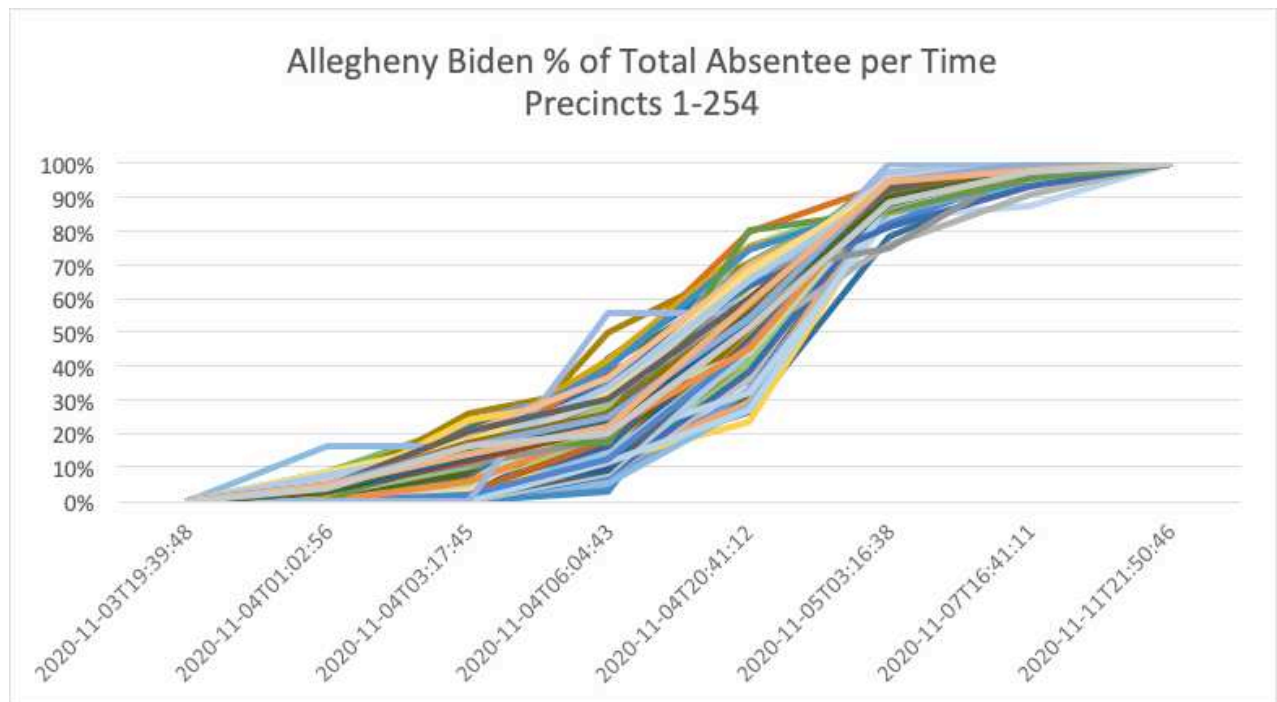
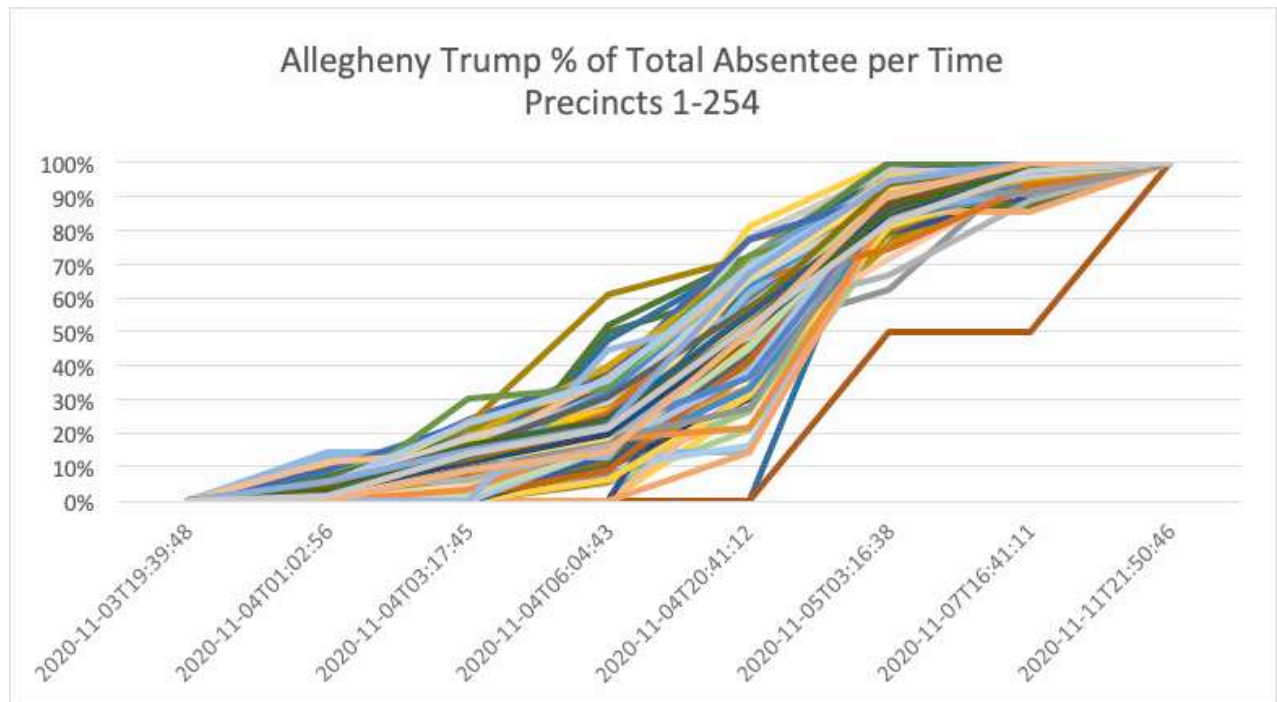
Breaking down the absolute votes per timestamp, note the beautiful round number of total absentee votes by Nov 11th – 340,000 on the nose. Checking the certified finals, this number grew about 4,000 votes, but that was many weeks after these timestamps.

<i>Time</i>	Trump	Biden	Jorgensen	Total
<i>2020-11-03T19:39:48</i>	0	0	0	0
<i>2020-11-04T01:02:56</i>	12147	51555	564	64266
<i>2020-11-04T03:17:45</i>	8658	39438	386	48482
<i>2020-11-04T06:04:43</i>	7855	33652	349	41856
<i>2020-11-04T20:41:12</i>	15822	64855	753	81430
<i>2020-11-05T03:16:38</i>	14842	59248	672	74762
<i>2020-11-07T16:41:11</i>	5565	18942	270	24777
<i>2020-11-11T21:50:46</i>	1038	3340	49	4427
TOTAL	65927	271030	3043	340000

Looking at the percent share of each candidate per timestamp, the ratio nearly perfectly fixed all throughout November 4th and 5th. The % gain starts deviating slightly by November 7th, but not much.

Lockstep Precincts

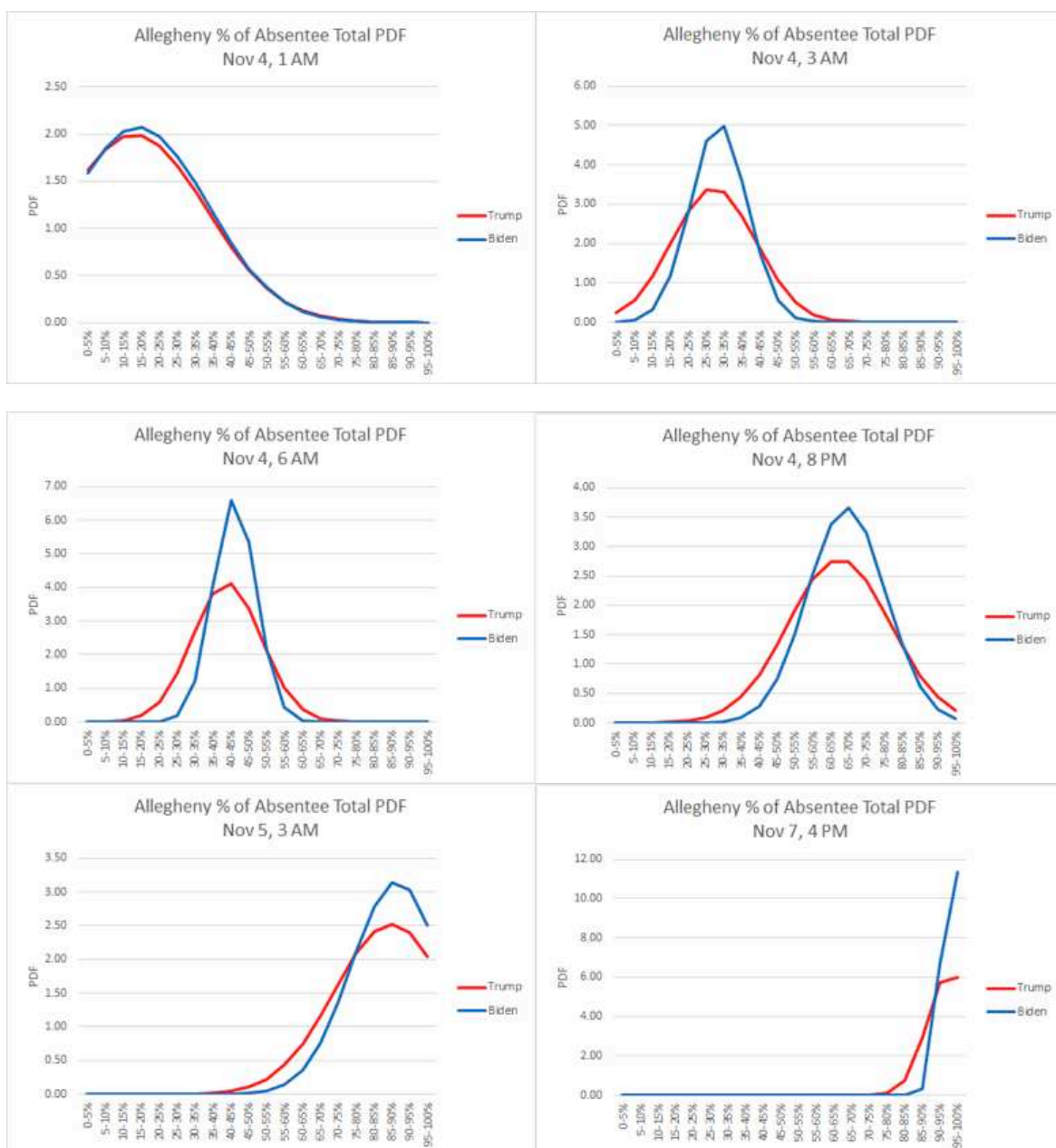
Checking if this is some kind of bizarre anomaly only at an aggregate level, we checked into the precinct level data. Allegheny has over 1300 precincts; one would not expect them to update at roughly the same rate as each other in any sort of sane logistical organization. As the figures show, sure enough, they do track with each other. Precincts 1-254 are shown each marching toward their eventual 100% take of absentee, with very few leaving the pack to complete early or start late. Other graphs have some variance, but the overall picture is consistent across time and candidate.



Finally, to put some math to this, we calculated the mean and standard deviation of each incremental gain toward the final total. The precincts roll in perfect harmony, much like two waves in a slow, synchronous drift toward the opposite side of the pool.

Time	Trump	Biden	Total	Trump	Biden	Total
n~1300	MEAN	MEAN	MEAN	STDEV	STDEV	STDEV
2020-11-04T01:02:56	18%	19%	19%	20%	19%	19%
2020-11-04T03:17:45	14%	14%	14%	12%	8%	8%
2020-11-04T06:04:43	12%	13%	12%	10%	6%	6%
2020-11-04T20:41:12	24%	23%	23%	14%	11%	10%
2020-11-05T03:16:38	22%	22%	22%	16%	13%	12%
2020-11-07T16:41:11	8%	7%	7%	6%	3%	3%
2020-11-11T21:50:46	1%	1%	2%	1%	1%	1%

Absentee Gain of % Total, by Timestamp



5 - Statistical Analysis of PA 2020 Election

(condensed version: full version available)

Dr. Robert Hancock

12/4/2020

Synopsis - Election results for the state of Pennsylvania (PA) were analyzed for potential anomalies. The state of Florida (FL) is used as reference for comparison, as the election results show a tight race for both states. Therefore, one would assume that the vote counts should be similar, at least on average. Two such anomalies have been identified: **(1)** The rates of votes added is significantly lower for Trump than Biden (even when normalized to the total vote count), indicating the possibility of pro-Biden systematic bias (weighted vote count); **(2)** *Statistically impossible* “jumps” in the vote counts are found in Biden’s favor for Pennsylvania.

Methodology - Edison Research election data was downloaded from the New York Times website on Nov. 25, 2020 and analyzed in MATLAB 2019b. (*The MATLAB code and JSON files are available on request.*) We used the state of FL as reference for comparison because no serious allegations of election fraud have been made to date for FL. The time axis for each state is as follows:

FL: from 2020-11-04 06:43:00 to 2020-11-20 14:16:04

PA: from 2020-11-04 09:25:23 to '2020-11-25 21:49:35

To simplify things, in the graphs below time is reported as “batch”, which roughly speaking corresponds to time. We use “time” and “batch” interchangeably in this document.

Our approach consists of analyzing the statistics of votes added from batch to batch. The rationale is that with each batch, the votes added enables us to study the potential occurrence of anomalous “jumps”. These jumps are denoted here as: Δ Trump and Δ Biden.

Analysis of Statistical Anomalies - Figure 1 (next page) shows the results for Florida. The four graphs shown are: [top left] cumulative vote count (Trump vs Biden) as function of time (batch), [top right] votes added (“jumps”) at each batch *divided by the time interval between consecutive batches* (i.e., we plot the “velocity” or “rate” of vote counts added, denoted Δ Trump and Δ Biden), [bottom left] correlation analysis of Biden jumps vs Trump jumps and [bottom right] plot of the residuals. “Residuals” is defined as the difference between Biden and Trump votes added (Δ Biden- Δ Trump) for each batch.

On the average, we expect Trump/Biden jumps to be of the same order of magnitude for each candidate. Wild differences in magnitudes, and especially ones that favor a particular candidate, are signs of potential anomalies. When the race is tight, we expect the points to lie along the diagonal **red** line, indicating that the jumps in vote counts are similar between both candidates. Deviations from the diagonal may indicate anomalous jumps.

As can be seen in the correlation plot, and to a larger extent in the residuals plot, statistically anomalous jumps are all in Biden's favor. A jump of magnitude shown by the green line is statistically impossible: the odds of this happening are 1 in 10^{23} . We see two such jumps in the FL data, both in Biden's favor.

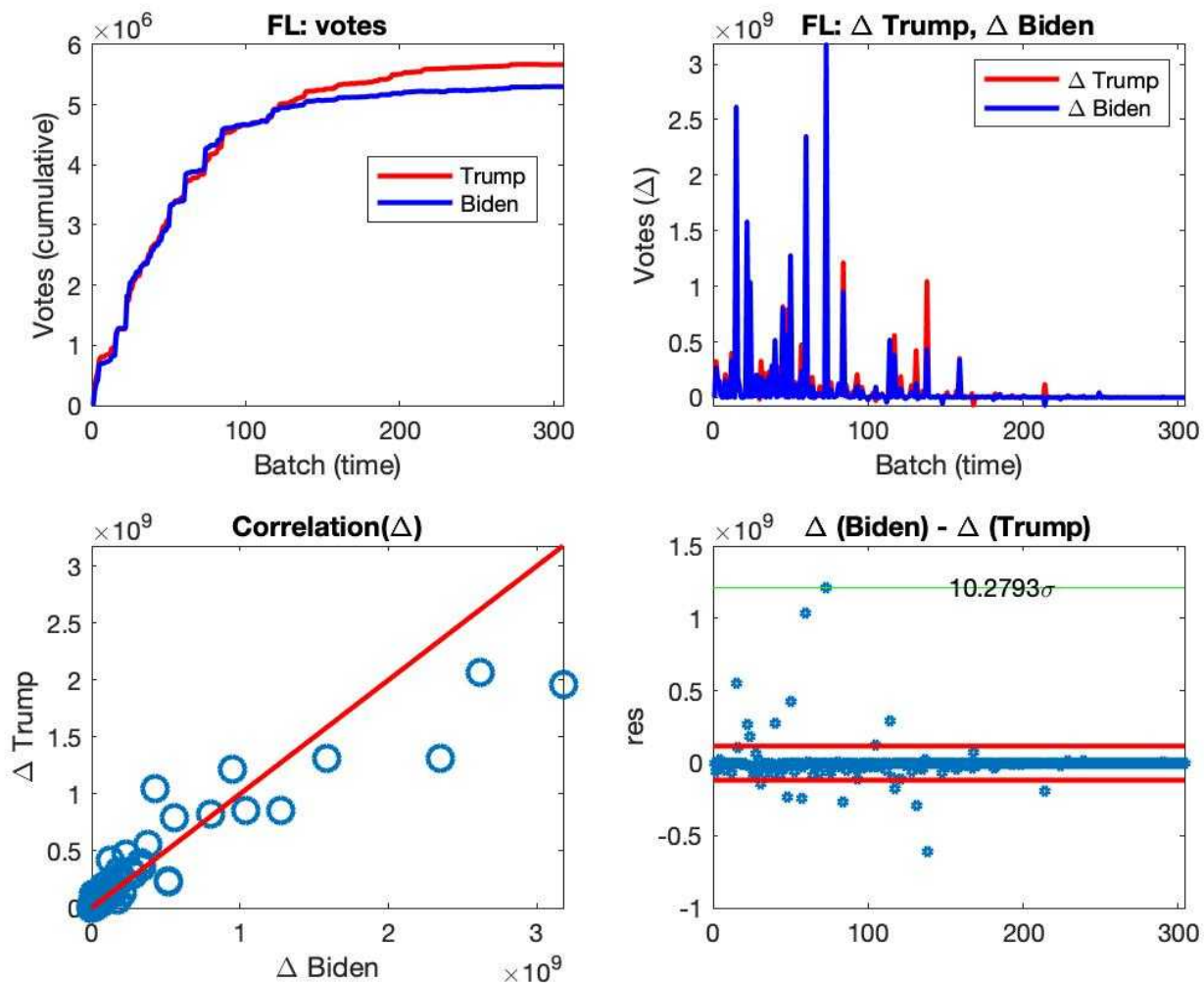


Figure 1. State of Florida election time series analysis.

For the PA election (Figure 2) there is one statistically impossible jump (in Biden's favor) to the level shown by the horizontal green line. The odds of this happening are 1 in 10^{87} .

We note that for both states, the largest jumps are not only statistically impossible, but all happen to be in Biden's favor. Further, all anomalous jumps occurred *after* the polls closed.

While the jump is slightly visible in the cumulative vote count (Figure 2 top left), it is most readily visible as a sharp spike in the *rate* at which votes were added (Figure 2 top right). This outlier is also apparent from the correlation graph (Figure 2 bottom left) and residuals plot (Figure 2 bottom right). Also, in the residuals plot (Figure 2 bottom right) the second largest outlier for Biden has odds of 1 in 10^{23} of happening.

These “impossible” Biden jumps are found at the following time stamps in the Edison data:
 PA: 2020-11-04 10:54:36 (+60,448 votes), 2020-11-04 02:16:43 (+12,401 votes)
 FL: 2020-11-04 00:32:23 (+435,219 votes) and 2020-11-04 00:38:40 (+367,539 votes)

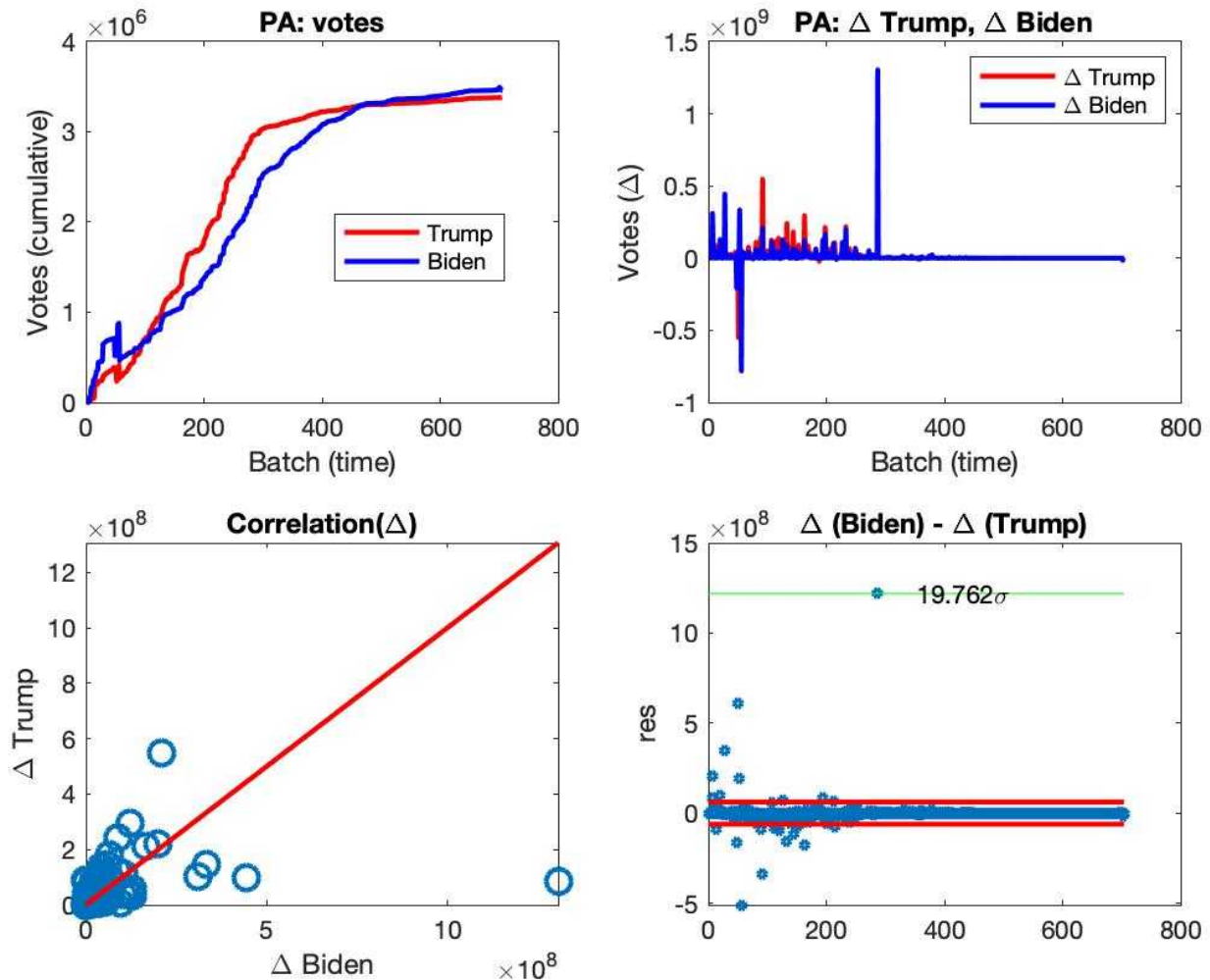


Figure 2. State of Pennsylvania (PA) election time series analysis.

Analysis of Statistical Bias in Votes Added - Focusing on Pennsylvania, Figure 2 (*top right plot*) shows results for votes added (including any jumps) for both candidates. We find that the votes added for Biden are systematically higher, i.e., there are considerably more events of the type $\Delta \text{Biden} - \Delta \text{Trump} > 0$. While this behavior may be expected for a “blowout race” where one candidate gets a much higher vote count than the other, it is unexpected in a race this close. To quantify the bias and likelihood of such an unlikely event, we are using Florida as a reference race.

Figure 3 presents an alternative way to plot the results of Figure 2 (top right). This plot shows the **Biden curve** consistently above the **Trump curve**. As shown by the **yellow regions**, across the *entire* frequency axis, votes added for Biden are consistently higher than those of Trump. This is indicative of bias in the way votes are added: **either the vote count for Biden is artificially inflated at every batch, or those of Trump are systematically depressed (or both).**

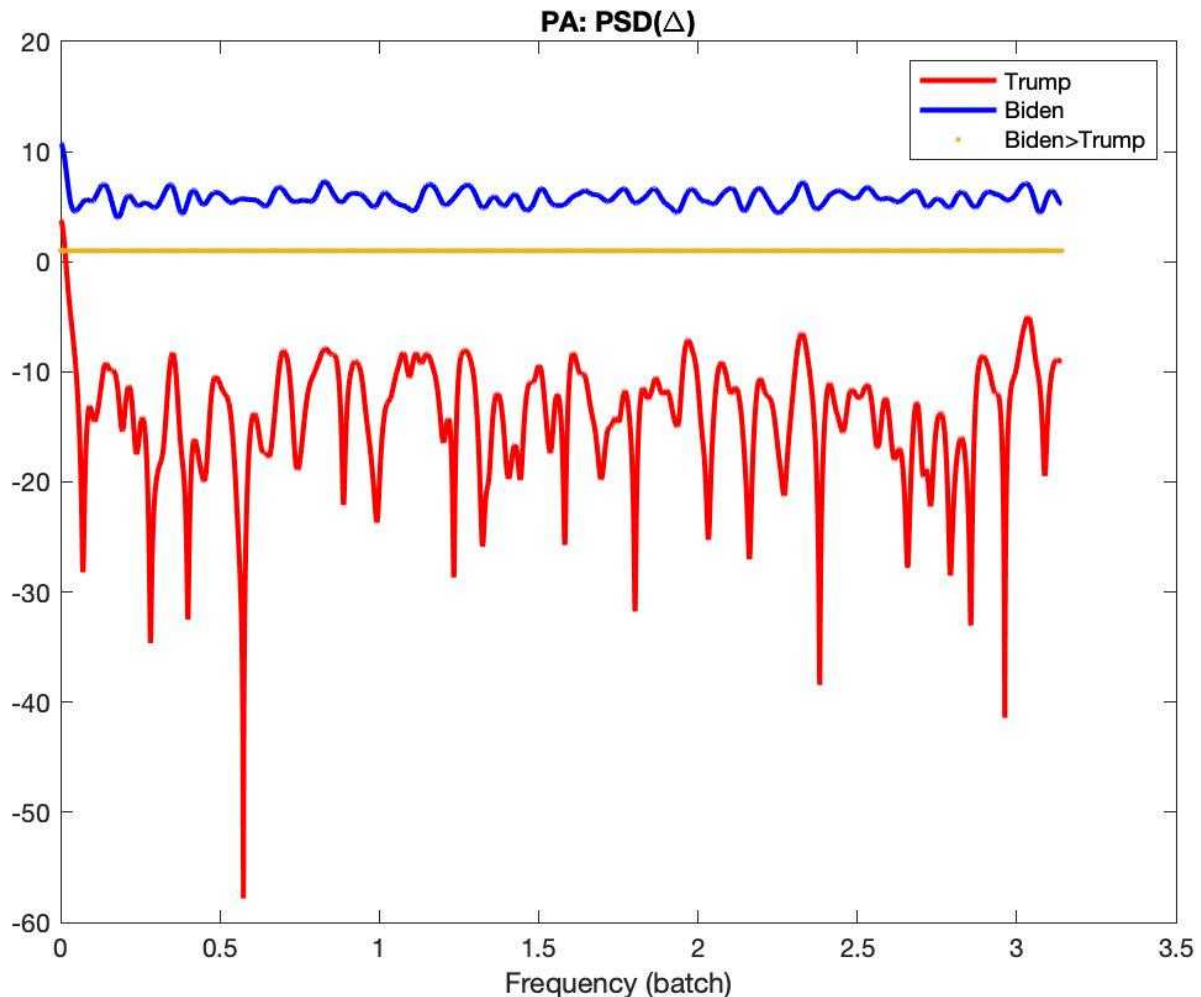


Figure 3. Comparison of statistical bias in the votes added for PA.

In Figure 3 the Vertical axis indicates votes added (for each candidate). Horizontal axis is frequency of batches. This plot, technically called “power spectral density (PSD)” (in units of decibels, dB), depicts how frequently such a vote-added count pattern occurs over time.

Quantification of the likelihood of such bias to occur was done using Florida as a reference time series. A statistical test¹ comparing the mean votes added (for PA vs FL) concluded that for Biden, the means are not statistically different, implying that the votes in PA likely have been counted using the same method as in FL.

On the other hand, the same test found significant differences in the way Trump votes in PA were added compared to FL. This could imply: *Biden vote counts were inflated, or Trump vote counts were depressed*. **The odds of this outcome are 1 in 1,000, an unlikely occurrence.** This statistical test used all data points in the time series and the mean value of each time series is dominated by small jumps, which happen most frequently (see Figures 1 and 2, top right).

We also compared the “tails” of the distributions between PA and FL, i.e., the larger jumps found in the time series of Δ Biden and Δ Trump (Figures 1 and 2, top right plots). These large jumps contain information about rare events, i.e., statistical anomalies. By considering the votes added that correspond to large jumps, we analyzed the behavior of large jumps while discarding the small jumps. Our analysis² found that the statistics of Biden large jumps in PA did not differ from those in FL. On the other hand, the analysis found that the statistics of Trump large jumps in PA differed from those in FL. **The odds of this happening are 1 in 10^{12} , a statistical impossibility.**

From Figure 3 the average PSD for Biden is 5.8 dB. For Trump, the average PSD is -14.0 dB. This is a difference of 19.8 dB. This difference corresponds to an order of magnitude (10-fold) in votes added favoring Biden over Trump. The fact that votes added systematically favor Biden over Trump, regardless of the frequency of such events (Figure 3 yellow line) is surprising given how close the race is.

Conclusions - Statistically impossible jumps in the Biden vote counts were found in the time series of election results. The existence of these jumps is evident from the rate at which votes were added. The largest of these jumps (PA election, +60,448 votes for Biden added during a single time interval around Nov. 4, 10:54:36), its odds of happening are 1 in 10^{87} , a vanishingly small probability.

The second largest jump (+12,401 votes around Nov. 4, 02:16:43) has odds of 1 in 10^{23} of happening. We also found systematic bias in the way votes were counted (rate of votes added), favoring Biden. With high certainty, Trump vote counts were depressed (or, possibly, Biden vote counts were inflated, or both). This bias was confirmed using multiple statistical methods³. These statistically unlikely events in the PA election all favored Biden. Our analysis is statistical and based on the Edison times series⁴. We recommend further investigations of the root causes of these observed results.

¹ Welch's t-test.

² Kolmogorov-Smirnov test, $\alpha=10^{-12}$.

³ A more detailed report is available upon request detailing our statistical analysis.

⁴ Edison dataset exhibited small occasional drops in candidates' vote counts, but the drops were small and neglected in our analysis; their presence does not alter our analysis and conclusions. For PA there are some larger dips at the beginning of the time series. The origin of those dips is unknown.

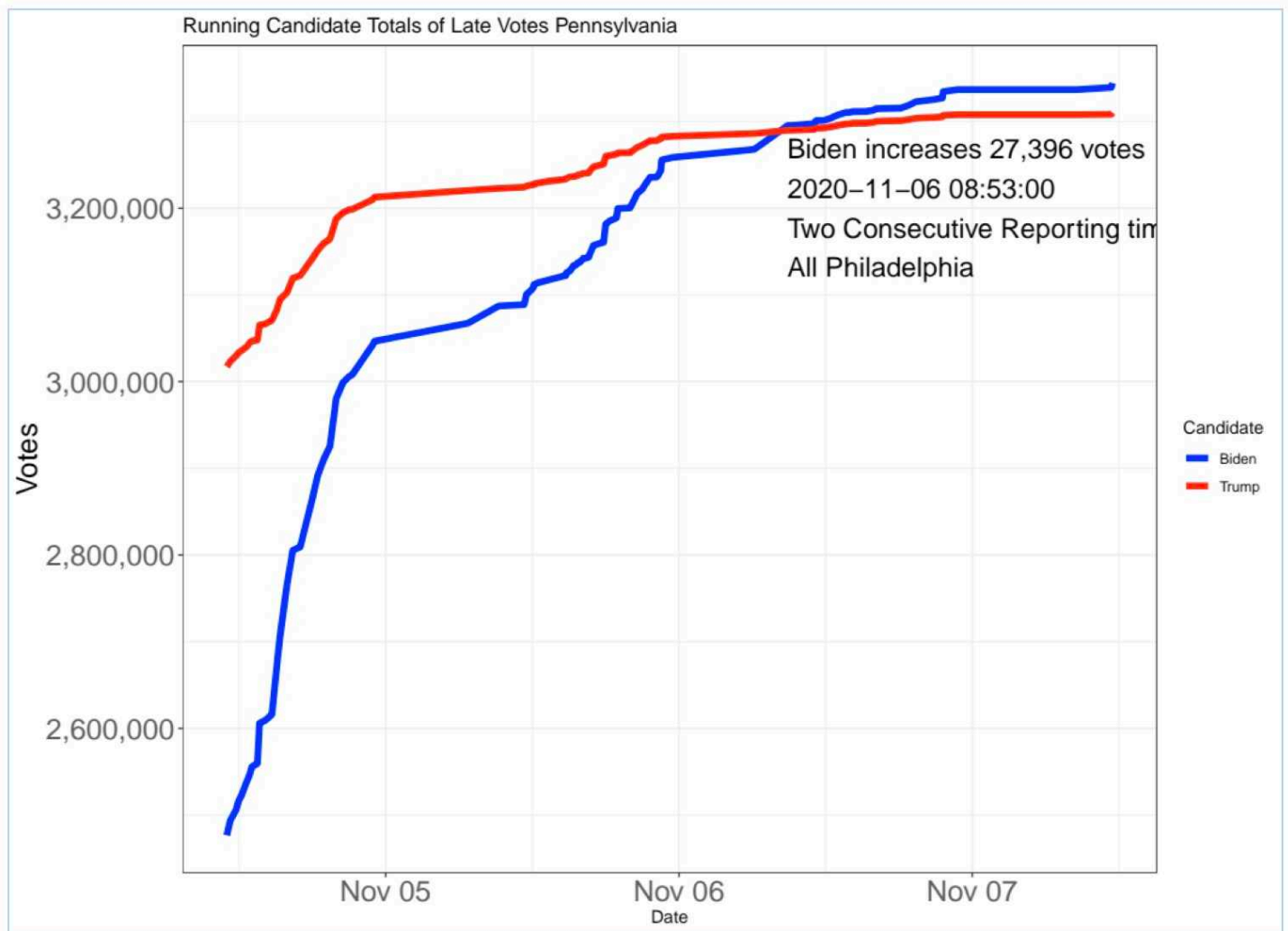
6 - Potential Voter Fraud in Pennsylvania

[Dr. William M. Briggs](#)

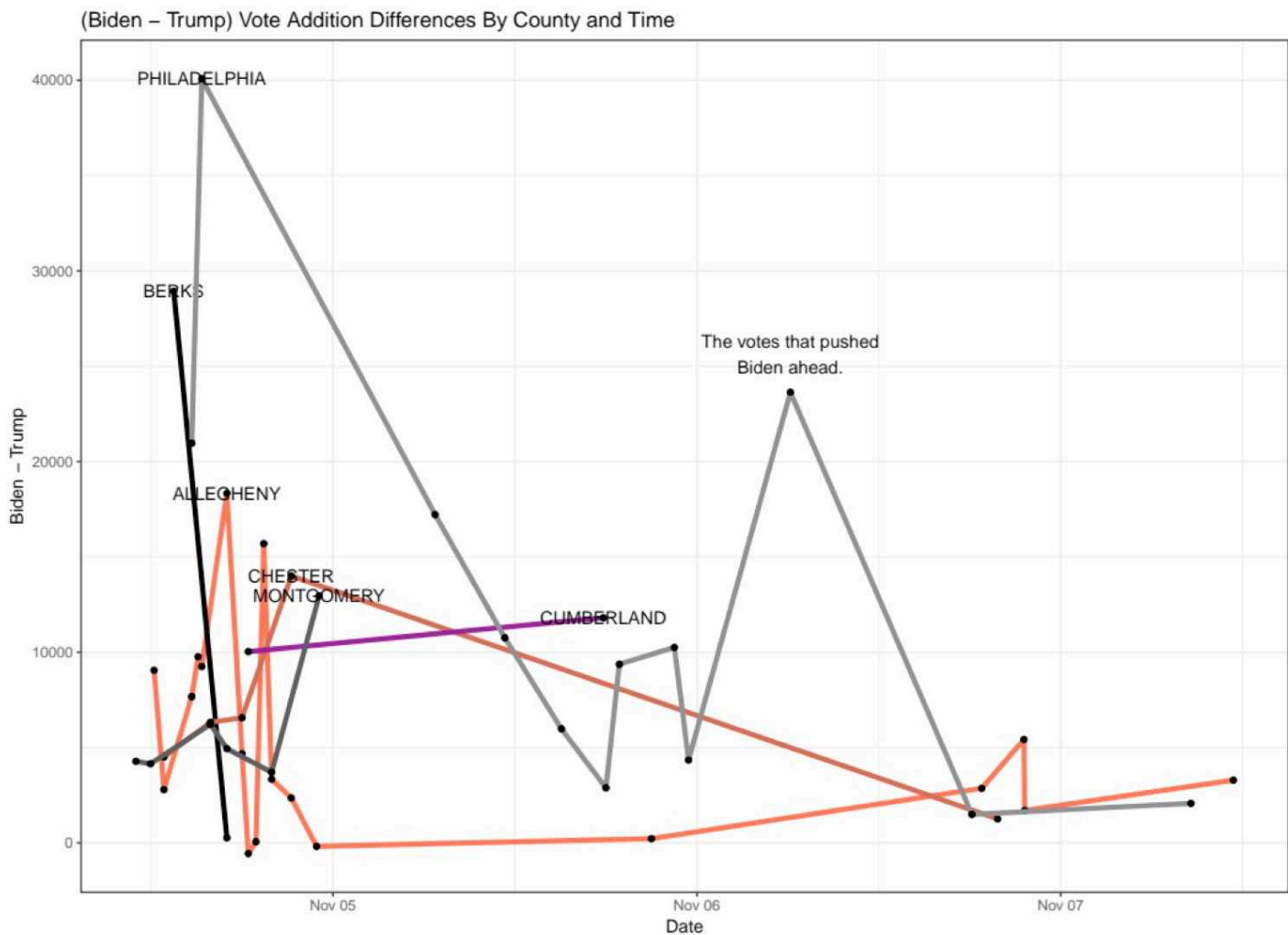
I used data provided to me of the hour-by-hour vote totals for both Biden and Trump beginning the day after the election. All analyses were conducted in R (version 3.6.1).

The following plots the cumulative total for both candidates beginning after election night.

VOTE TOTALS

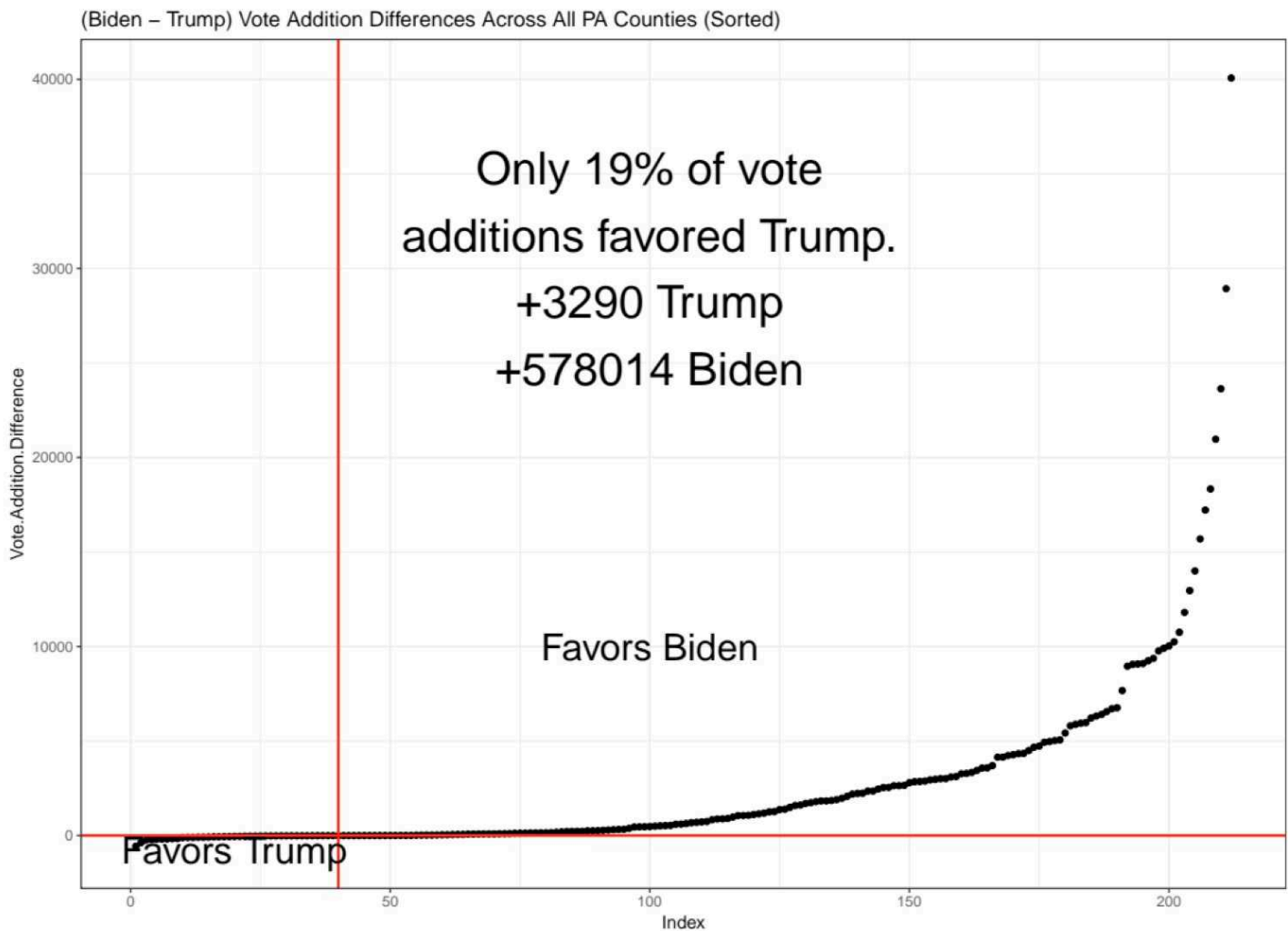


Trump starts well ahead, but due to enormous increases at specific time points (demonstrated next), Biden catches up rapidly. Obviously, those adding the votes in time do not know what the eventual total will be. This is what makes the late addition on the 6th suspicious. Biden's total was augmented by just over 27 thousand votes, which was just enough to put him ahead. The time was also near where the vote count was nearing its end.



Pictured here are (Biden – Trump) vote differences in time for several counties (all with major additions to the counts). County names appear at the maximum of the difference. Berks, Philadelphia, Chester, Montgomery, Cumberland and Allegheny counties all give early advantage to Biden. But it was Philadelphia county that pushed Biden ahead. No other vote additions after this time were important or came close to changing the lead for Biden. The size of the difference at the late time bears investigation.

Most of the vote changes after election night favored Biden, which is odd. Here is a picture of these sorted from low to high (Biden – Trump) non-zero vote changes.



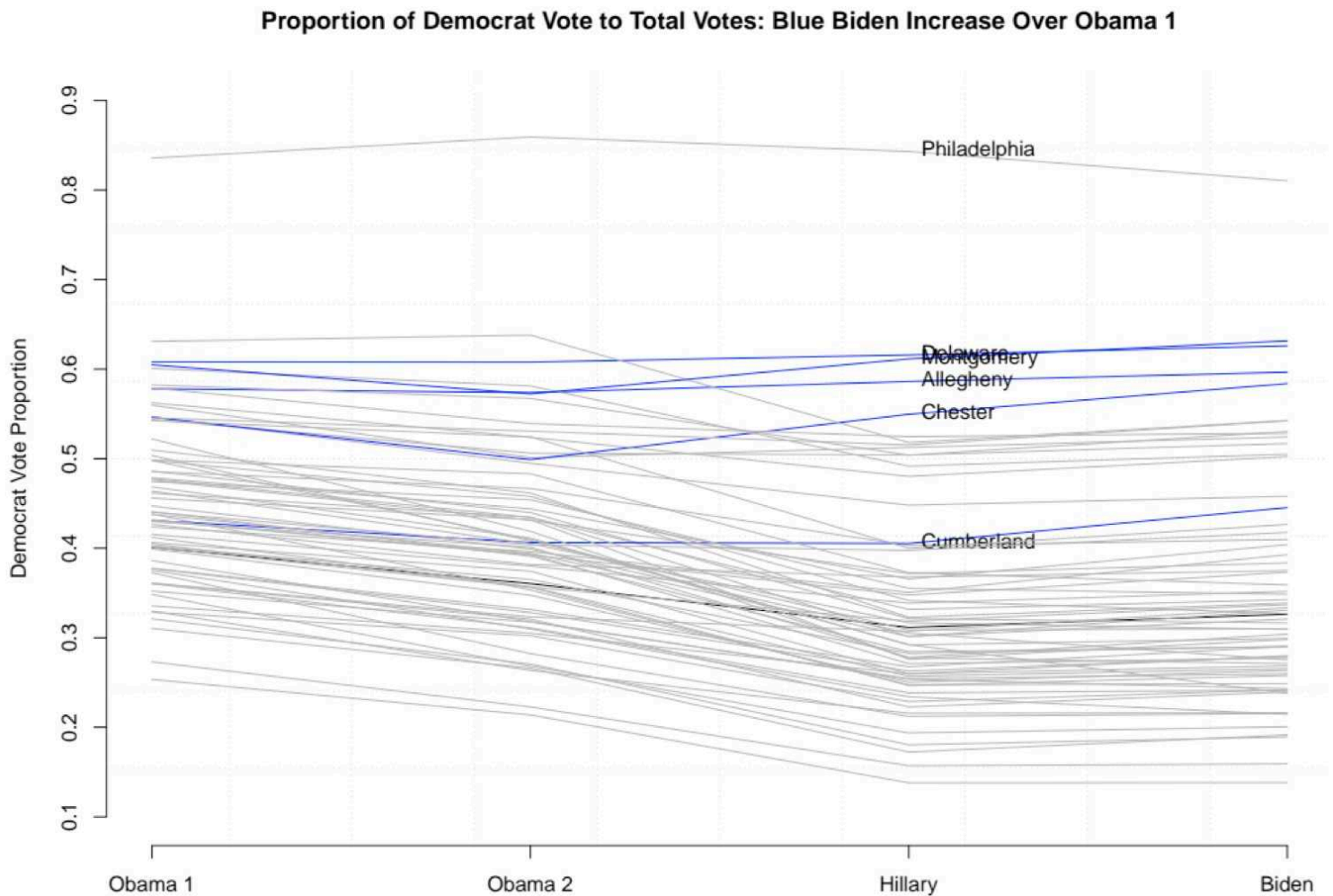
Only 19% of the times when new votes were tallied favored Trump, and for only an advantage of 3,290 votes. 81% of the changes favored Biden, for an advantage of over 550,000 votes. There is also a visible difference in distribution of these additions, centering (as the picture above shows) mainly on Philadelphia county.

This next plot (next page) makes this more apparent. It shows all additions for both candidates, sorted from the counties which added the most votes to the least. Blue dots are votes for Biden, red for Trump. Several counties are highlighted that show curious large additions for Biden.

Vote Additions > 0

CURIOUS COUNTIES

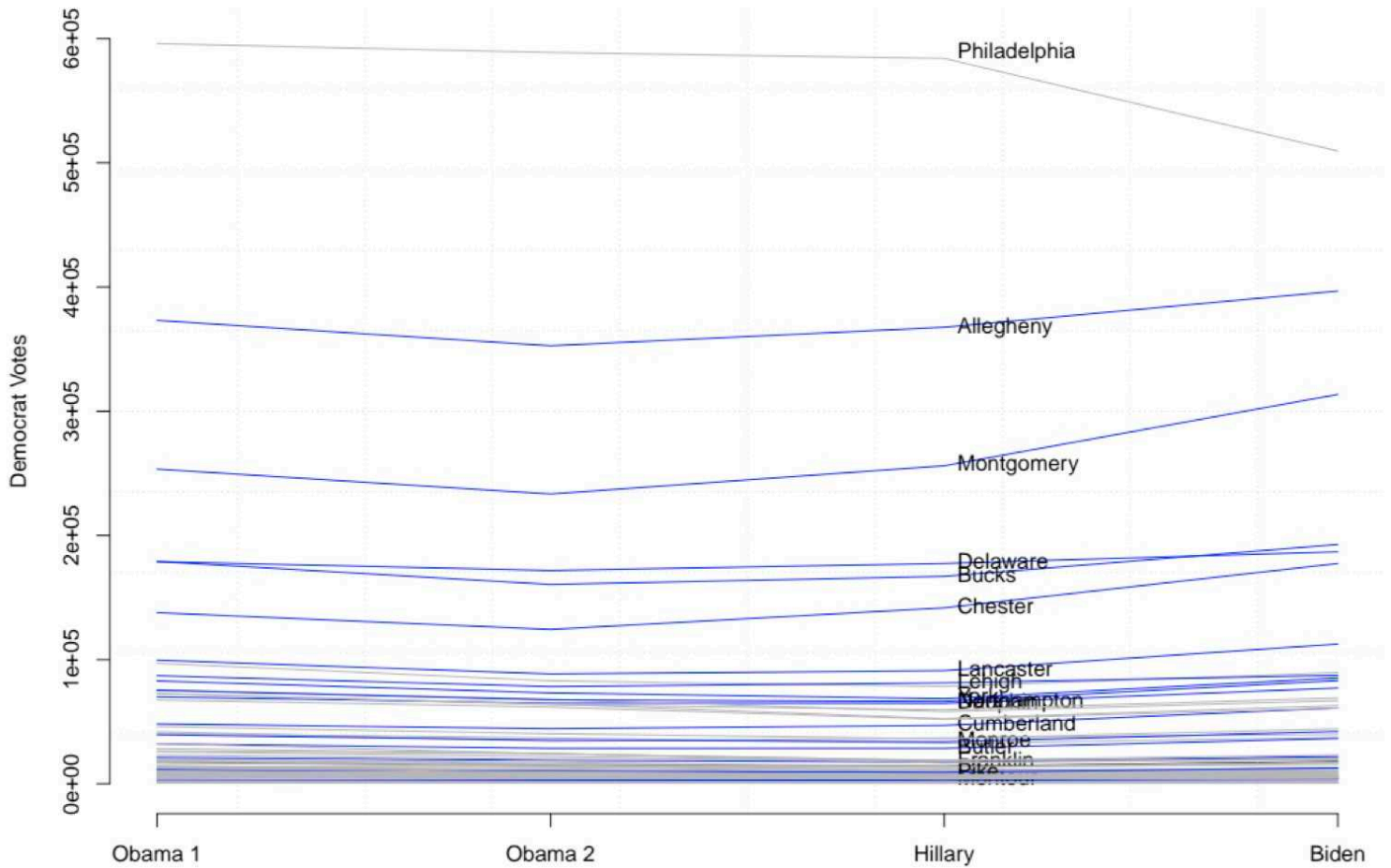
Here is a plot (using data on final election tallies provided by the same source) of the proportion of total votes Democrat presidential candidates received since Obama's first run. Those counties in which Biden improved over Obama's first run are highlighted in blue.



The proportion Democrats had been getting was declining steadily until 2020. Most stayed about the same from Hillary to Biden, but a few rose about their 2008 levels, which is odd, given Obama's gargantuan popular support at the time, and Biden's almost invisible public support in 2020.

The next picture is the same, but for total votes received for Democrat candidates.

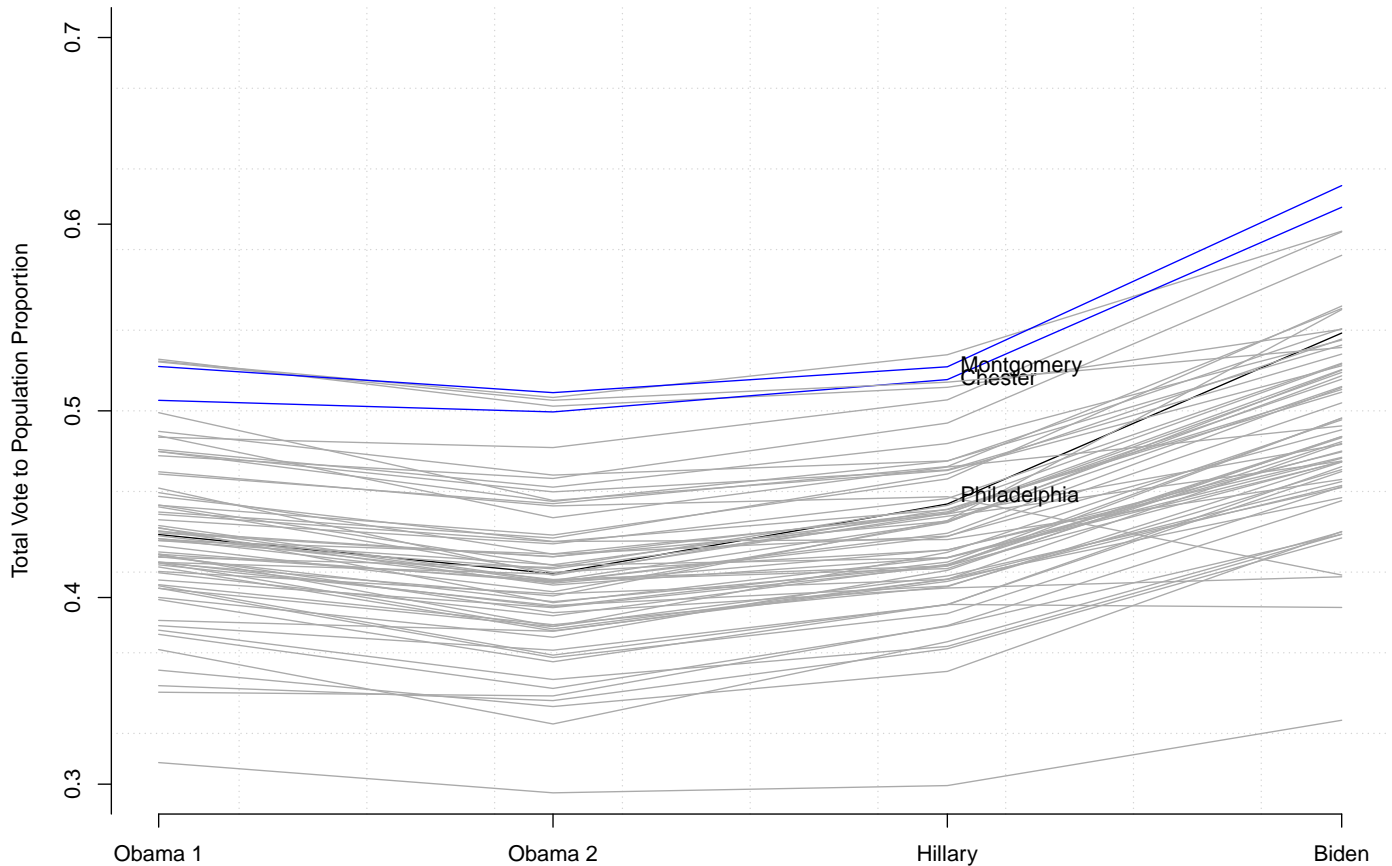
Democrat Votes by Race: Blue Biden Increase Over Obama 1



Again, counties which recorded more votes for Biden are highlighted in blue.

Another way to look at this is the total votes cast for any candidate divided by county population (data on population provided by Wikipedia).

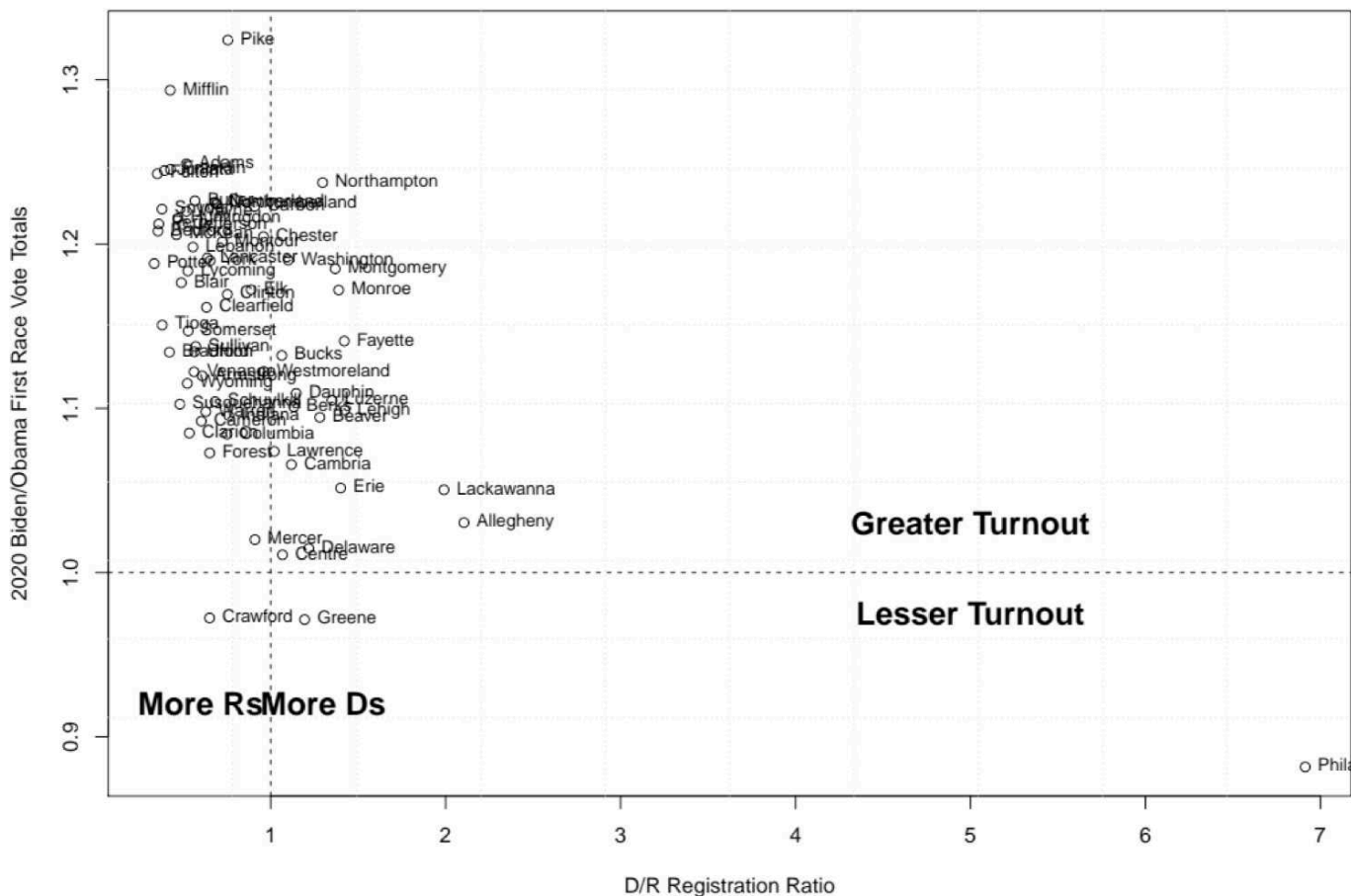
Proportion of Total Vote to Population: Blue Biden Over 60%



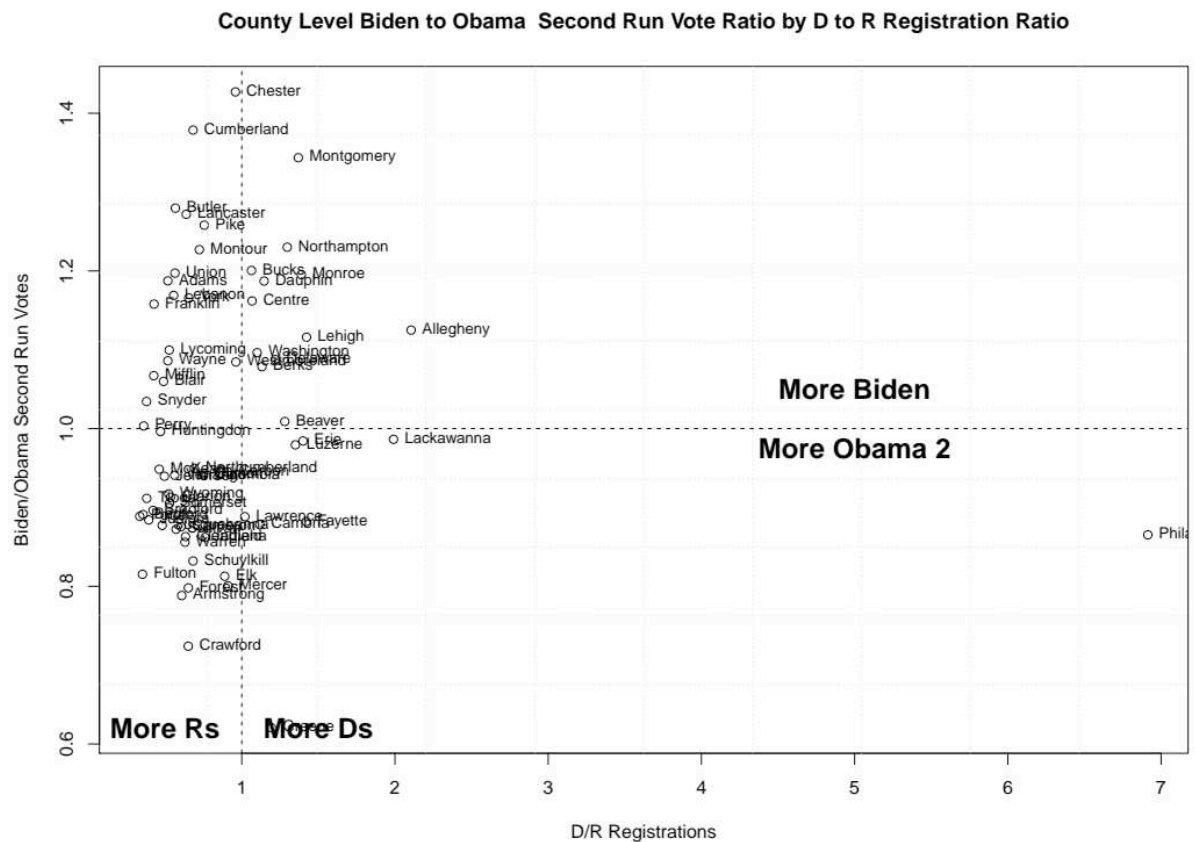
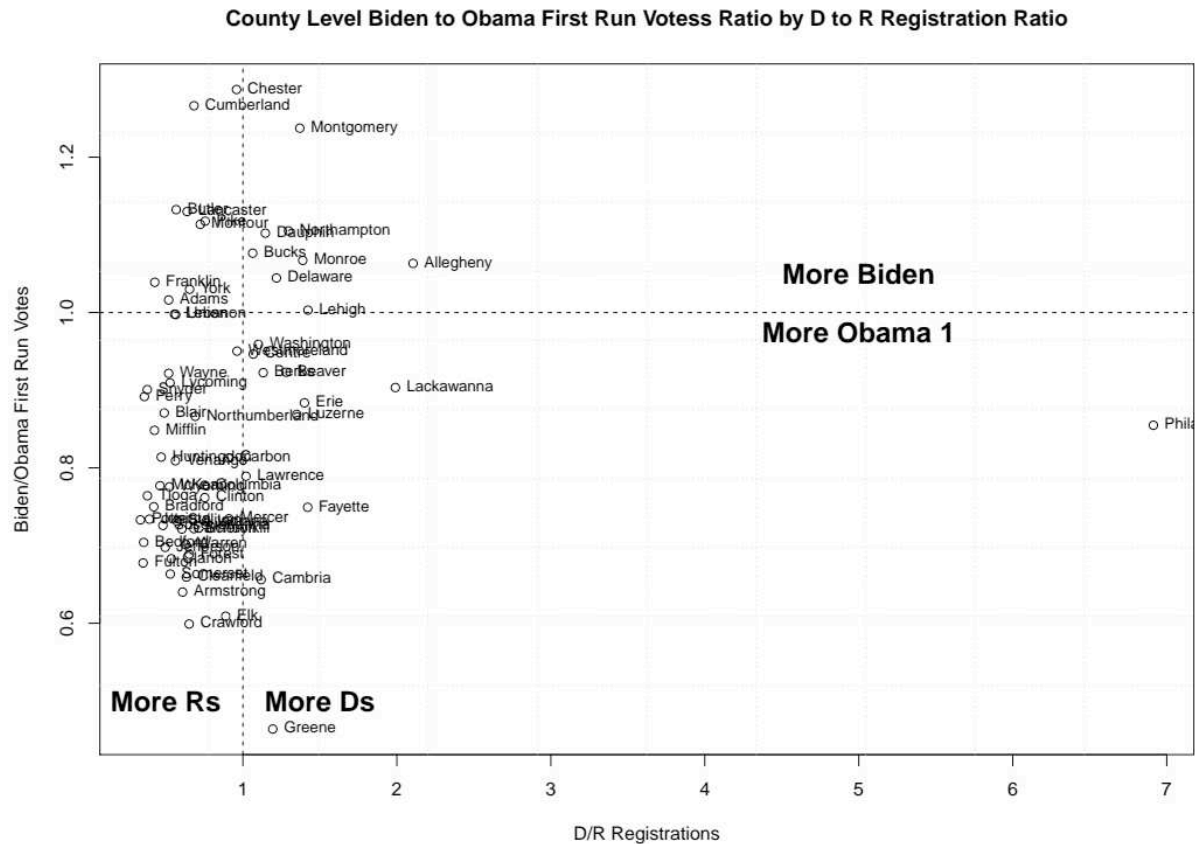
As before, those counties which had higher proportions for Biden than Obama's first run are highlighted in blue. Philadelphia is also noted since it is so large.

The next series of pictures looks at Biden's improvement in total race turnout (votes for all candidates), or not, over his Democrat predecessors' race turnout, by examining the ratio of Biden/Democrat race total votes (for all candidates in any election; this is a measure of turnout) and plotted for each county's proportion of Democrat to Republican registered voters. Counties with proportions < 1 are predominately Republican.

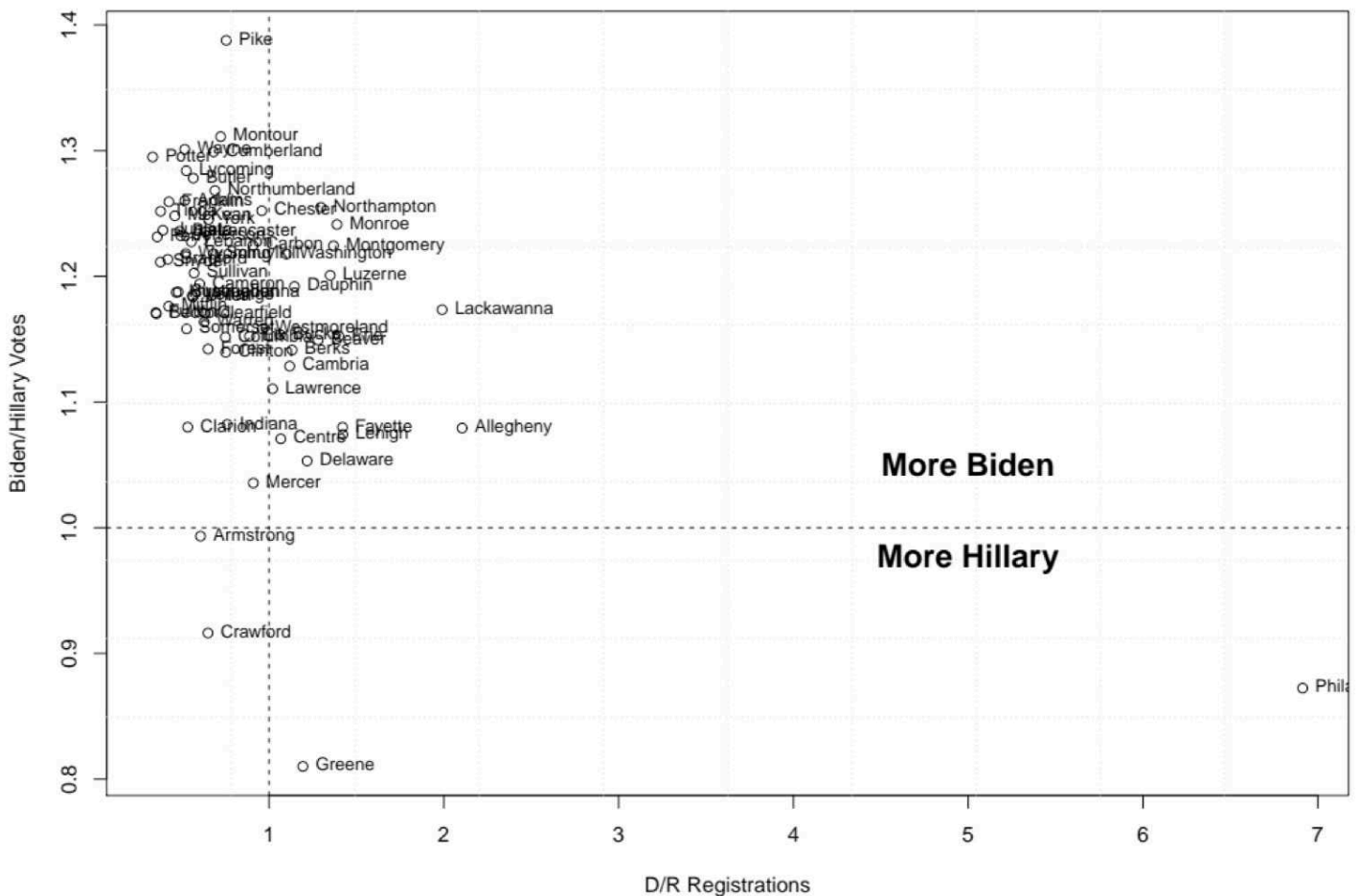
County Level 2020 Biden to Obama First Run Vote Total Ratio by D to R Registration Ratio



Another way to look at this is the ratio of Biden votes, i.e., votes just for Biden, over the votes for the other Democrat candidates. This is a measure of popularity, and not turnout per se, like the above figures. Again, this is plotted for each county and by country registration proportion.



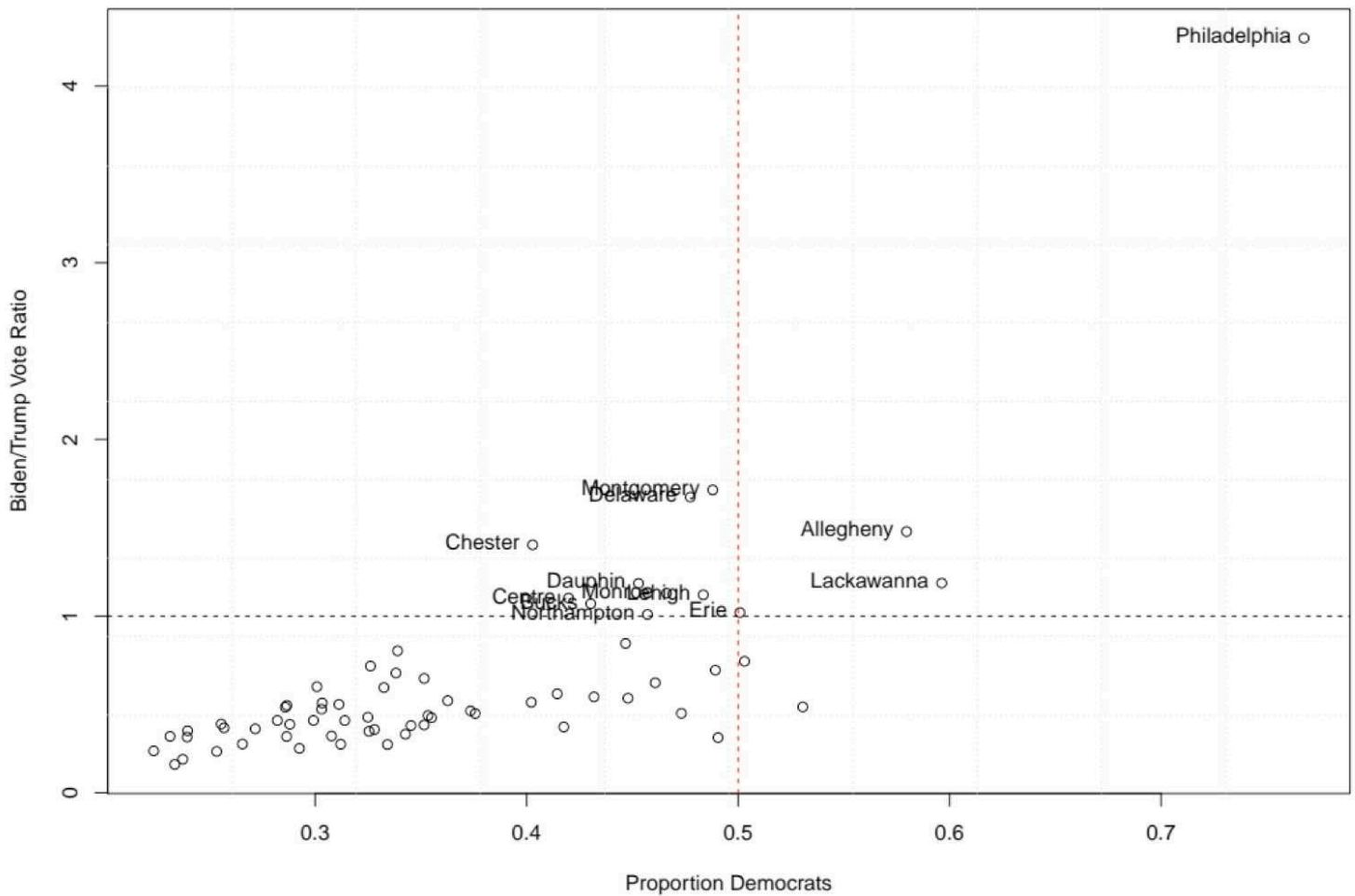
County Level Biden to Hillary Vote Ratio by D to R Registration Ratio



Once more, it's very strange that Biden managed to increase his support over the other Democrat candidates, especially in predominately Republican counties.

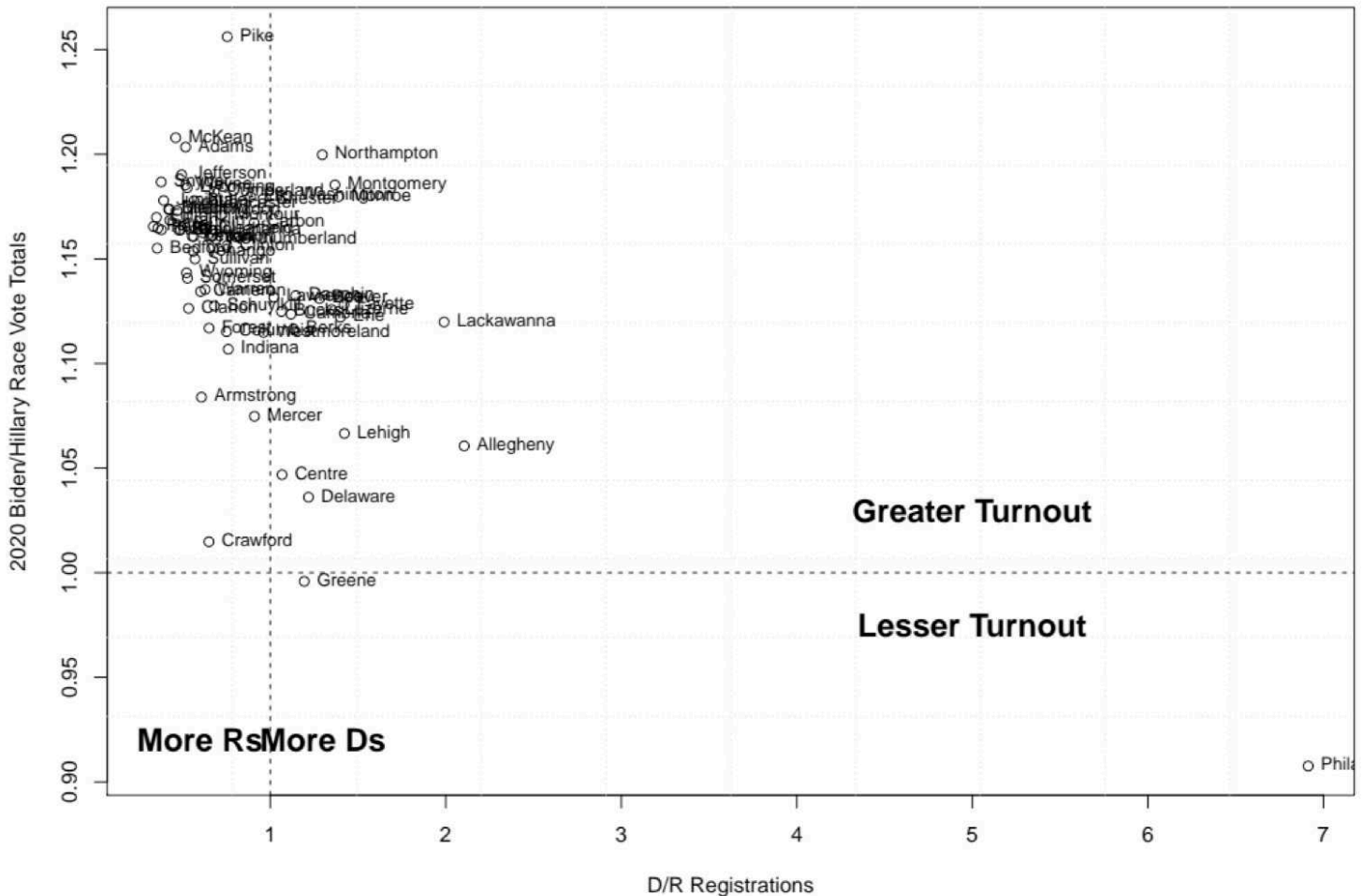
Another way to look at this is plotting the proportion of Democrat to Republican registrations by the ratio of Biden to Trump total votes received in the race.

Proportion of Democratic Registrations by Biden/Trump Votes



Counties which are predominately Republican have “Proportion Democrats” < 0.5. It’s not surprising, necessarily, that Philadelphia county, which is overwhelming Democrat in registrations would have a large Biden/Trump vote ratio. But it is very curious several predominately Republican counties would.

County Level 2020 Biden to Hillary Vote Total Ratio by D to R Registration Ratio



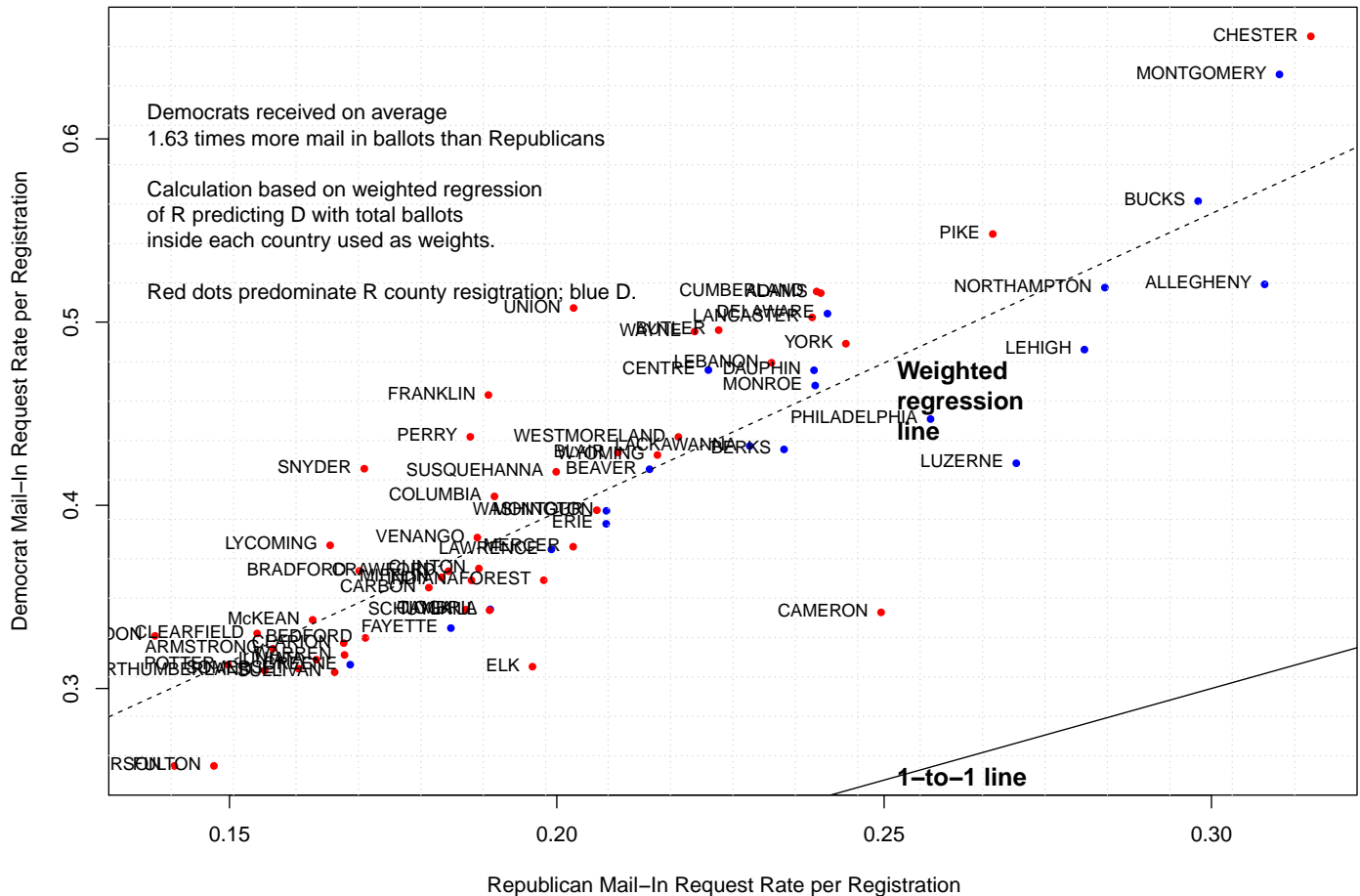
It's very odd the Biden race in total votes bested Obama's first run race total votes (for all candidates) by 20% to 40% in counties which were predominately Republican. In other words, turnout was much higher for 2020 than in Obama's first run against McCain.

MAIL-IN VOTE ANALYSIS

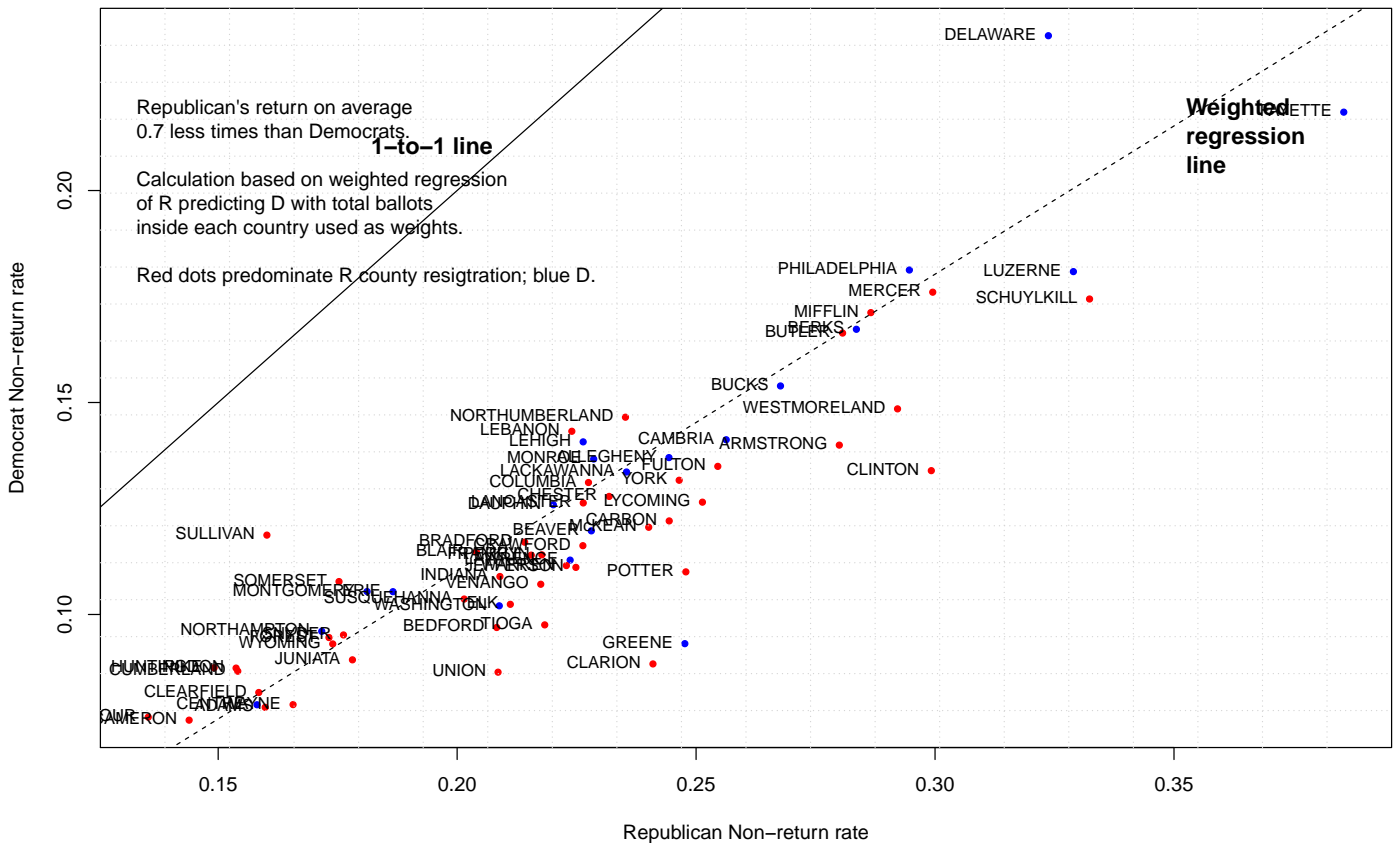
Data on mail-in ballots in Pennsylvania was provided by the same source. It contained the applicant's party affiliation, birth date, the dates the ballots were mailed to applicants, and the dates the ballots were received by authorities. County registration data was used as above, too.

The first thing to note is who requested mail-in ballots. The county ratio of ballots requested by registered voter total is plotted for each party. Dots are red for predominately Republican counties, or Blue for predominately Democrat counties.

Comparing D–R Non–Return Mail–in Ballot Request Rates per Registration County Level



Comparing D-R Non-Return Mail-in Ballot Rates County Level



If Republicans were recorded as returning ballots at the same rate as Democrats, counties would line up on the 1-to-1 line. As it is, a weighted regression (as above) shows Republicans were recorded as returning ballots 0.58 times less often than Democrats.

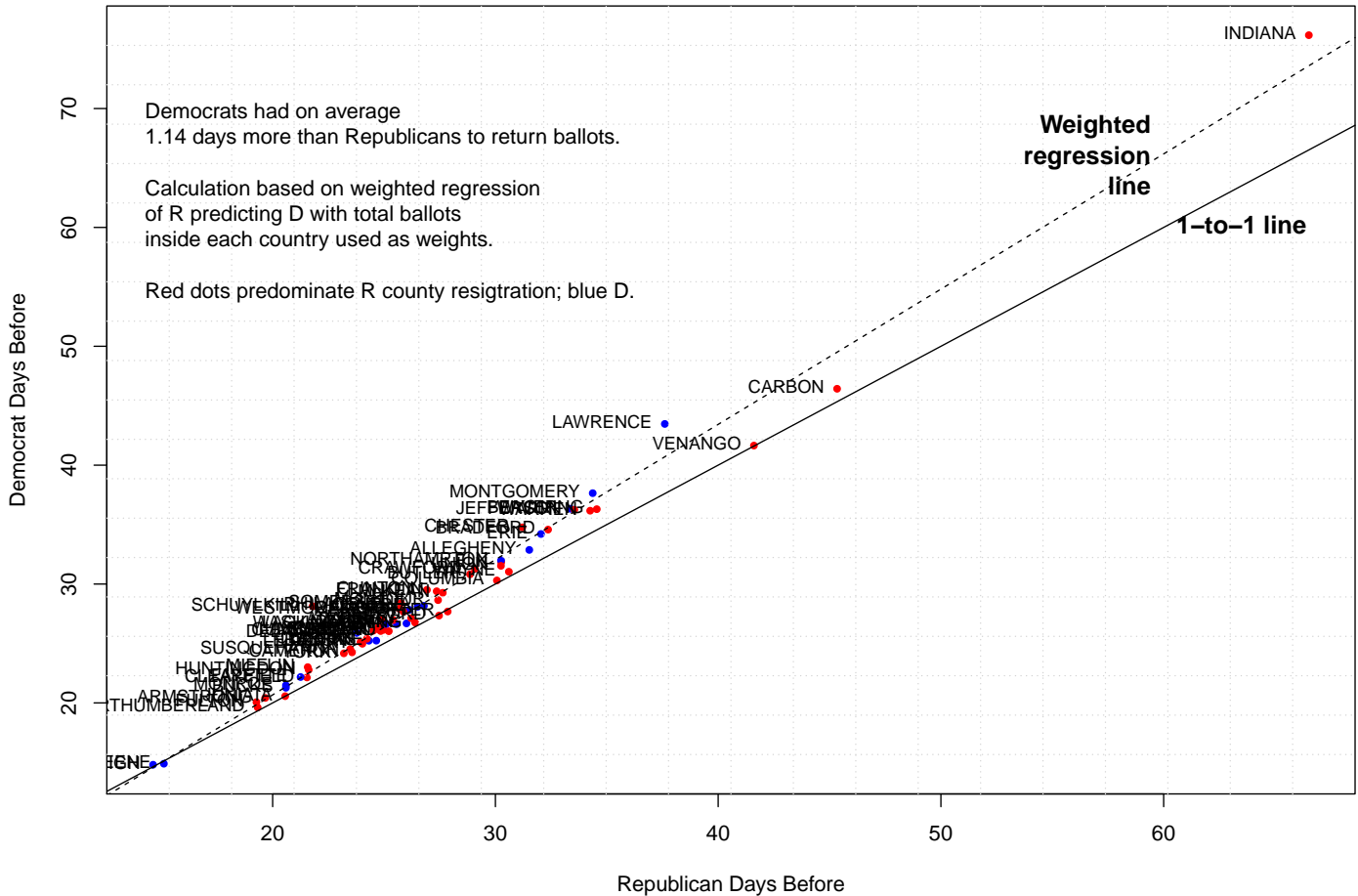
So far we have that just under twice as many Democrats as Republicans were recorded as requesting ballots, and about twice as many Democrats were recorded as returning those ballots. This is also curious and hard to explain logically.

Age did not seem to make any difference in the analysis, nor did breaking any of these charts down by the finer level of State House Districts.

There is one last curiosity. The ballots were mailed so-many days before election day. Ballots mailed to people more days before election day obviously had more time to consider their choices and more time to return their ballots.

Plotted next is the country mean number of days before the elections Republicans were recorded as having ballots mailed out versus Democrats.

Comparing D-R Mean Days Before Election Ballots Mailed to Voters



As above, if Republicans were recorded as having as much time as Democrats, the points would fall on the 1-to-1 line. As it is, a weighted regression (as above) showed Democrats had an average 1.12 more days before election than Republicans. Whether or not this is important can be debated, but it was curious to see this happening in almost all counties.

Summary

Several nationally recognized statistical experts were asked to examine some 2020 Pennsylvania voting records, and to identify anything they deemed to be statistically significant anomalies — i.e deviations from the norm.

In the process they basically worked separately from other team members, consulted with other experts, analyzed the data they were given from different perspectives, obtained some additional data on their own, etc. — all in a very limited time allotment.

Their one — and only — objective was to try to assure that every legal Pennsylvania vote is counted, *and* only legal Pennsylvania votes are counted.

The primary takeaway is that ALL of these experts came to the same conclusions:

- 1) There are some major statistical aberrations in the PA voting records, that are extremely unlikely to occur in a normal (i.e., un-manipulated) setting.
- 2) The anomalies almost exclusively happened with the Biden votes. Time and again, using a variety of techniques, the Trump votes looked statistically normal.
- 3) Eleven (out of 67) Pennsylvania counties stood out from all the rest. These counties (see p 11) showed distinctive signs of voting abnormalities — again, all for Biden.
- 4) The total number of PA suspicious votes is $300,000\pm$ — which greatly exceeds the reported margin of Biden votes over Trump. See the next page for an outline of the the several analyses and our conclusion of how many suspicious votes there are.
- 5) These statistical analyses do not prove fraud, but rather provide scientific evidence that the reported results are highly unlikely to be an accurate reflection of how Pennsylvania citizens voted.

As stated in the Executive Overview, our strong recommendation is that (as a minimum):
the five worst of the eleven abnormal PA counties have an immediate thorough audit.

If the results of such an audit are that there is **no** significant change in voting results for all of these five counties (very unlikely), then the authors of this Report recommend that we write off those county deviations as an extreme statical fluke, and that the Pennsylvania voting results be certified.

On the other hand, if the results of such an audit are that there **are** significant changes in voting results for some of these five counties, then the authors of this Report recommend that (as a minimum) that the next six (6) statistically suspicious counties also have a thorough audit, prior to any certifying of the Pennsylvania voting results.

Pennsylvania Vote Anomalies Overview

This table is for those too time-constrained to study each of the chapters in this report. It is strongly advisable to carefully read any chapter where there is a question about the number of suspect ballots, and/or how there were determined.

Author	Anomalous Ballots	Type of Analysis	Reference
Cox	Unknown	Timeseries	Chapter 1
Young	300,000	Contrast (11 counties)	Chapter 2
Quinnell	58,000	Linear Regression Prediction Allegheny & Montgomery Counties	Chapter 3
Quinnell	340,000	Synchronous Absentees, Allegheny County	Chapter 4
Hancock	60,000	Timeseries	Chapter 5
Briggs	Unknown	Incremental Imbalance, Timeseries	Chapter 6
Briggs	62,000	Phone Survey	MI Chapter 7*
300,000±		Estimated Number of Suspect Pennsylvania Ballots	

* See our [Michigan Report](#) Chapter 7.

Note 1: The reported Pennsylvania differential is that Biden is leading by 80k± votes.

Note 2: All *Anomalous Ballot* numbers are estimated, and rounded to the nearest thousand.

Note 3: There is no way of knowing whether the same suspect votes are appearing in different analyses — **or** whether some are additional. For this conservative overview, we are assuming that most of the votes in each statistical analysis are duplicated in the others.

Note 4: *Anomalous Ballots* can be either: **a)** fabricated votes [e.g., duplicates, deceased persons, etc.], **OR b)** votes taken from Trump and given to Biden [e.g., switched *via* a computer algorithm]. Of course there could also be some combination of the two.

The net effect of which it is, is enormously different. For example, 50k *fabricated* votes will result in a **50k** difference. However, 50k *switched* votes will result in a **100k** differential. To be conservative we are assuming the former in our analyses.

Note 5: The *Anomalous Ballots total* (300k±) is our rough, conservative estimate about the number of Pennsylvania ballots that we believe are suspect. If we guess that 50% of those are *switched* votes and 50% are *fabricated*, that would mean a 300k± reduction in the votes for Biden and an increase of a 150k± votes for Trump — i.e., a 450k± vote change. In other words, Trump would have actually won Pennsylvania by 370k± votes.