Exhibit D

A Simple Test for the extent of Vote Fraud with Absentee Ballots in the 2020 Presidential Election: Georgia and Pennsylvania Data

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Summary

This study provides two methods to measure vote fraud in the 2020 presidential election, though they provide inconsistent evidence. To try isolating the impact of a county's vote-counting process and the potential fraud, I first compare voting precincts in a county with alleged fraud to adjacent similar precincts in neighboring counties with no allegations of fraud. In measuring the difference in President Trump's vote share of the absentee ballots for these adjacent precincts, we account for the difference in his vote share of the in-person voting and the difference in registered voters' demographics. I compare data for the 2016 and 2020 presidential elections. There is some weak but inconsistent evidence of vote fraud for Georgia and Pennsylvania. In Pennsylvania, the evidence is strongest for the provisional ballots. Voters were allowed to correct defects in absentee ballots using a provisional ballot on Election day – implying an additional 6,700 votes for Biden.

Second, vote fraud can increase voter turnout rate. Increased fraud can take many forms: higher rates of filling out absentee ballots for people who hadn't voted, dead people voting, ineligible people voting, or even payments to legally registered people for their votes. However, the increase might not be as large as the fraud if votes for opposing candidates are either lost, destroyed, or replaced with ballots filled out for the other candidate. The estimates here indicate that there were 70,000 to 79,000 "excess" votes in Georgia and Pennsylvania. Adding Arizona, Michigan, Nevada, and Wisconsin, the total increases to up to 289,000 excess votes.

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[*] This research purely reflects my own personal views. This research does not represent work done by or for the US Department of Justice, and it has not been approved of by the DOJ.

Introduction

Courts have frequently rejected Republican challenges to the 2020 presidential vote because they want evidence that a case involves enough fraud to alter the vote's outcome in a particular state. Republicans argue that since their observers couldn't watch the vote count, they can't provide that evidence and have asked for discovery. Still, while the courts have agreed that irregularities have occurred, they weren't willing to grant discovery unless Republicans first present enough evidence of fraud to overturn the election. Republicans thus faced a kind of Catch 22.

This paper's approach allows us to quantify how large a potential problem vote fraud and other abnormalities might be in the 2020 election. The process is applicable to other states where precinct-level data is available on voting by absentee and in-person voting.

Concerns over fraud with absentee ballots is not something limited to Republicans in the United States. Indeed, many European countries have voting rules stricter to prevent fraud than what we have in the United States.[1] For example, 74% entirely ban absentee voting for citizens who live in their country. Another 6% allow it, but have very restrictive rules, such as limiting it to those in the military or are in a hospital, and they require evidence that those conditions are met. Another 15% allow absentee ballots but require that one has to present a photo voter ID to acquire it. Thirty-five percent of European countries completely ban absentee ballots for even those living outside their country. The pattern is similar for developed countries.

Many of these countries have learned the hard way about what happens when mail-in ballots aren't secured. They have also discovered how hard it is to detect vote buying when both those buying and selling the votes have an incentive to hide the exchange.

France banned mail-in voting in 1975 because of massive fraud in Corsica, where postal ballots were stolen or bought and voters cast multiple votes. Mail-in ballots were used to cast the votes of dead people.[2]

The United Kingdom, which allows postal voting, has had some notable mail-in ballot fraud cases. Prior to recent photo ID requirements, six Labour Party councilors in Birmingham won office after what the judge described as a "massive, systematic and organised" postal voting

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[1] John R. Lott, Jr., "Why do most countries ban mail-in ballots?: They have seen massive vote fraud problems," Crime Prevention Research Center, revised October 15, 2020 (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3666259).

[2] Staff, "In Corsica, the tormented history of the vote by correspondence," World Today News, June 15, 2020 (https://www.world-today-news.com/in-corsica-the-tormented-history-of-the-vote-by-correspondence/). Jean-Louis Briquet, "EXPATRIATE CORSICANS AND THE VOTE AU VILLAGE: MECHANISMS OF CONTROL AND EXPRESSIONS OF SENTIMENT (NINETEENTH–TWENTIETH CENTURIES)," *Revue française de science politique (English Edition)* Vol. 66, No. 5 (2016), pp. 43-63; Staff, "Corsicans of France Are Feeling the Sting of Publicity Given to Criminals," New York Times, January 7, 1973 (https://www.nytimes.com/1973/01/07/archives/corsicans-of-france-are-feeling-the-sting-of-publicity-given-to.html).

fraud campaign.[3] The fraud was apparently carried out with the full knowledge and cooperation of the local Labour party. There was "widespread theft" of postal votes (possibly around 40,000 ballots) in areas with large Muslim populations because Labour members were worried that the Iraq war would spur these voters to oppose the incumbent government.

In 1991, Mexico's 1991 election mandated voter photo-IDs and banned absentee ballots. The then-governing Institutional Revolutionary Party (PRI) had long used fraud and intimidation with mail-in ballots to win elections.[4] Only in 2006 were absentee ballots again allowed, and then only for those living abroad who requested them at least six months in advance.[5]

Some European countries allow proxy voting, but that is very strictly regulated to minimize fraud. For example, proxy voting requires the verification of photo IDs and signed request forms. In Poland, a power of attorney is necessary to have a proxy vote and then can only be granted by the municipal mayor. In France, you must go in person to the municipality office prior to the elections, provide proof of who you are, provide proof of reason for absence (for example, letter from your employer or medical certificate), and then nominate a proxy. Proxy voting is not only very limited, but it prevents the problem that absentee ballots are unsecured. Proxy voting requires that the proxy vote in-person in a voting booth.

Unsecured absentee ballots create the potential that either fraudulent ballots will be introduced or votes to be destroyed. Some safe guards can at least minimize these problems, such as requiring matching signatures, but even this is not the same as requiring government issued photo voter IDs. Nor does it prevent votes from being destroyed. In addition, one of the controversies in this election was that states such as Georgia, Nevada, Pennsylvania, and Wisconsin did not match signatures on the outer envelopes match the voters' registration records.[6] Other states, particularly Pennsylvania, were accused of accepting absentee ballots that didn't even have the outer envelope where the voter's signature would be or were missing postmarks.[7]

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[3] Nick Britten and George Jones, "Judge lambasts postal ballot rules as Labour 6 convicted of poll fraud," The Telegraph (UK), April 2005 (https://www.telegraph.co.uk/news/uknews/1487144/Judge-lambasts-postal-ballot-rules-as-Labour-6-convicted-of-poll-fraud.html).

[4] John R. Lott, Jr., "Evidence of Voter Fraud and the Impact that Regulations to Reduce Fraud Have on Voter Participation Rates," SSRN, August 18, 2006 (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=925611). For example, as a result of fraud in their 1988 Presidential election, absentee ballots were not allowed in Mexico until 2006 (see Associated Press, "Mexican Senate approves mail-in absentee ballots for Mexicans living abroad," AZcentral.com, April 28, 2005 (http://www.azcentral.com/specials/special03/articles/0428mexicovote-ON.html).

[5] James C. McKinley, Jr., "Lawmakers in Mexico Approve Absentee Voting for Migrants," New York Times, June 29, 2005 (https://www.nytimes.com/2005/06/29/world/americas/lawmakers-in-mexico-approve-absentee-voting-for-migrants.html).

[6] Peter Navarro, "The Immaculate Deception: Six Key Dimensions of Election Irregulaties," December 15, 2020.

[7] Ibid.

Vote fraud concerns are important in that they will not only alter election results, but they can also discourage voter participation.[8]

The following sections provide mixed evidence on the existence of vote fraud. The precinct level estimates for Georgia and Pennsylvania provide little or no evidence of vote fraud. I then look at all the swing states by county to see if counties with fraud had higher turnout rates, and there is evidence there consistent with fraud.

II. Georgia

In Georgia's certified ballot count, former Vice President Joe Biden leads President Trump by 12,670 votes.[9] Biden won Fulton County by a margin of 243,904 votes, and the absentee ballots in the county by 86,309 votes.[10]

Part of the controversy with Fulton County's absentee ballots arises from a burst pipe that resulted in the removal of poll watchers. According to the Chair of the Georgia Republican Party, David J. Shafer, "counting of ballots took place in secret after Republican Party observers were dismissed because they were advised that the tabulation center was shutting down for the night" (Letter dated November 10, 2020 from Doug Collins and David Shafer to Georgia Secretary of State Brad Raffensperger, p. 3).

If election workers counted absentee ballots when Republican observers were not present, is there statistical evidence of bias in the absentee ballot counting? While in-person voting took place at the precinct level, absentee vote counting took place at one common facility at the county level. If the type of fraud that Mr. Shafer worries about occurred, it would have only affected the absentee ballots in Fulton County.

To examine that, I looked at precinct-level data for Fulton County and the four Republican counties that border it and no fraud has been alleged: Carroll, Cherokee, Coweta, and Forsyth.[11] The idea is a simple one: compare Trump's share of absentee ballots in precincts adjacent to each other on opposite sides of a county border. The comparison is made between precincts in Fulton and these four other counties as well as between precincts in these four counties where they are adjacent each other. Comparing a county were fraud is alleged to ones without alleged fraud is simpler than comparing counties where there might be hard-to-specify varying degrees of fraud.

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[8] John R. Lott, Jr., "Evidence of Voter Fraud and the Impact that Regulations to Reduce Fraud Have on Voter Participation Rates," Social Science Research Network, 2006 (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=925611).

[9] "US election 2020: Biden certified Georgia winner after hand recount," BBC, November 20, 2020 (https://www.bbc.com/news/election-us-2020-55006188).

[10] This was quite different from previous elections. For example, in 2012, while Obama received 64% of the total vote in Fulton County, he barely received a majority of the absentee vote, taking 50.89% (data from Clark Bensen at Polidata).

[11] Corrected data was not available for Fayette County, but including this data resulted in no change in the level of statistical significance for either Tables 1 or 2.

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Precincts adjacent to each other on opposite sides of a county border should be relatively similar demographically. There are 384 precincts in Fulton County and 42 precincts in Cherokee County in 2020. In one case, Fulton County precinct ML02A matches up with four different precincts in Cherokee County (Mountain Road 28, Avery 3, Union Hill 38 and a small portion of Freehome 18).[12] The goal is to compare the precincts of Fulton county that are most similar to precincts nearby counties that had no allegations of fraud, in order to isolate the impact of Fulton county's vote-counting process (including potential fraud).

The analysis also accounts for the percent of in-person votes that went for Trump, because if you have two adjacent precincts and they are similar in terms of their demographics and in-person voting, one would expect them to also be roughly similar in terms of their absentee ballots. While Democrats were pushing their voters to vote by absentee ballot at both the national and state level, there is no reason to expect that rate to differ between two precincts that are next to each other and are similar in terms of their in-person voting support and their demographics.

Any difference it Trump's share of the absentee ballots would not have been caused by the general shift to absentee voting among Democrats, because the study controlled for in-person voting. In layman's terms, in precincts with alleged fraud, Trump's proportion of absentee votes would be expected to be depressed – even when such precincts had similar in-person Trump vote shares to their surrounding countries. The fact that the shift happens only in absentee ballots, and when a country line is crossed, would be suspicious.

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[12] The model is given as:

A = absentee ballots for Trump

TA = total absentee ballots for both candidates

P = in-person votes for Trump

TP = total in-person votes

a = A/TA

p = P/TP

$Y_i = (a_i^0 - a_i^1)$

where the superscripts 0 and 1 indicate adjacent precincts in neighboring counties

$X_i = (p_i^0 - p_i^1)$

D = 1 if one of the adjacent precincts is in Fulton County (in that case Fulton County is superscript 0), D = 0 otherwise

$Y_i = \beta X_i + \delta D^*X_i + u_i$, and u is the error term.

Null hypothesis: $\delta = 0$.

Precinct pairs in which one is the Fulton County precinct are no different from other pairs.

Alternative hypothesis: $\delta < 0$.

Precinct pairs in which one is the Fulton County precinct undercounts Trump's absentee ballots.

The other counties are matched west to east and south to north. For a related discussion see Stephen G. Bronars and John R. Lott, Jr., "Criminal Deterrence, Geographic Spillovers, and the Right to Carry Concealed Handguns," American Economic Review, May 1998, pp. 475-479.

Eggers et al. (2021) raises a valid robustness concern with regard to how precinct pairs are ordered in the control.[13] (The geographical ordering convention in Bronars and Lott 1998 (AER) was used.)[14] Eggers et al. correctly point out that the ordering is arbitrary here and so should not affect the results. It should not matter whether we subtract control precinct A from B or subtract B from A. Reversing the order flips the signs for a given data point. But there is a solution to their concerns. The results themselves would have been robust and unaffected by the intercept term is removed from the regressions.

What is the problem with an intercept for the control precincts? It implies that two identical adjacent precincts have a predictable difference in voting behavior. A linear regression without an intercept is robust because it is symmetric around the origin and thus unaffected by and data points being reflected about it.

I did this test using the data from both 2016 and 2020. There were no serious accusations of fraud with respect to absentee ballots in 2016, so one should expect the absentee ballot percent for Trump in precincts in Fulton county to behave no differently than the adjacent precincts in Carroll, Cherokee, Coweta, and Forsyth. In 2016, the average difference between the difference in Trump's share of the absentee ballots and his share of the in-person votes in the adjacent precincts was only 0.75 percentage points.

The results in Table 1 show that in 2016, there was no statistically difference between Trump's share of absentee ballots cast in Fulton and other counties.[15] Trump's share of absentee ballots also matched up closely with his share of in-person votes across the precincts, no matter which county they lay in.

Redoing the same test for 2020 again shows a similar pattern (see Table 2).[16] Trump's percentage of absentee votes was slightly lower in Fulton county border precincts than in the precincts just across the street in neighboring counties, but again it was statistically insignificant.

In the first two tables, if the estimate for the "Difference in Trump's percent of the two-candidate in-person vote" between the two adjacent precincts equals 1, it means that the differences in the percent of the in-person vote Trump received in the adjacent precincts would perfectly track the difference in the absentee ballots. In the estimate for 2016, the coefficient of 0.87 is not statistically different from 1. But for the 2020 data, Trump's share of in-person

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[13] Andrew Eggers, Haritz Garro, and Justin Grimmer, "Comment on 'A Simple Test for the extent of Vote Fraud with Absentee Ballots in the 2020 Presidential Election: Georgia and Pennsylvania Data,'" Working paper, January 4, 2021.

[14] Stephen G. Bronars and John R. Lott, Jr., "Criminal Deterrence, Geographic Spillovers, and the Right to Carry Concealed Handguns," American Economic Review, May 1998, pp. 475-479.

[15] The source for the 2016 precinct border lines was obtained here: http://rynerohla.com/index.html/election-maps/2016-south-atlantic-republican-primaries-by-precinct/

[16] The average difference between the difference in Trump's share of the absentee ballots and his share of the in-person votes in the adjacent precincts was -6.04 percentage points.

votes did not line up as closely with the differences in absentee ballots, as can be seen in the reduced coefficient of the control variable for Trump's share of in-person votes. Indeed, the coefficient for 2020 (at .6059) is statistically significantly less than 1 at the 0.0000% level for a two-tailed t-test.

This can also not be explained by the general shift in which Democrats were more likely to vote absentee, because the precincts being compared are matched up by location (differing primarily in terms of which side of the county line they lie on) and thus expected to be very similar.

This study goes further and controls for demographic variables, to account for any differences that might still exist. Georgia collects information on registered voters' racial and gender demographics by precinct. Table 3 accounts for the differences in the adjacent precincts by replacing the change in the in-person difference in Trump's share of the votes with detailed demographic information. It provides information on the difference between the precincts in the percent of the population that are black males, black females, Hispanic males, Hispanic females, Asian males, and Asian females. Table 4 then not only includes those variables but then also again the "Difference in Trump's percent of the two-candidate in-person vote." Thus, this estimate uses three ways to account for differences in Trump's share of the absentee ballot vote: geographic closeness for relatively small areas, differences in Trump's share of the in-person vote, and differences in the demographics registered voters.

The results provide inconsistent estimates that Trump's percentage of absentee votes was consistently lower in Fulton county border precincts than in the precincts just across the street in neighboring counties. The estimates for the Fulton County effect range from 0.3% to 11.5%, but only one of those estimates is statistically significant. The variables for the race and gender demographics are virtually never statistically significant, though that is not particularly surprising given how highly correlated these variables are. That also makes it difficult to interpret individual coefficients on the demographic variables. However, they are statistically only significant as a group in Tables 3 (a joint F-test for the demographic variables finds an F-value of 4.17, respectively, which are both statistically significant at better than the 5 percent level).

This indicates that the demographic values are worth including, and that table 4 is the preferred model. But all models agree that Trump's absentee ballot share was depressed in Fulton County precincts.

Given that there were 145,267 absentee ballots cast for Trump and Biden in Fulton county, the unusual drop off in Trump's share of the absentee ballots for Fulton county ranges from zero to 11.53 percentage points. This highest estimate equals approximately 16,749 votes, or 32% more than Biden's margin of victory over Trump. There are concerns about vote counting in DeKalb county, but there are no Republican counties adjacent to it for me to use in a test. However, there were another 128,007 absentee ballots cast for the two major-party candidates in DeKalb.

If there were also fraud in terms of the *in-person* voting in Fulton County that worked to also help Biden, the estimates presented here will underestimate the amount of fraud with the absentee ballots. For example, in Georgia as well as Nevada, Pennsylvania, and Wisconsin there were allegations that large numbers of in-person voters were not legally registered.[17] In Fulton County, Georgia, 2,423 voters were not listed on the State's records as being registered and 2,560 felons who voted had not completed their sentence were registered.[18]

Using the average value for these various estimates (7.81%) shows that an unusual drop in Trump's share of the absentee ballots for Fulton County alone of 11,350 votes, or 90% of Biden's vote lead in Georgia.

While some critics of this research have worried about errors being correlated across precincts within a county,[19] that isn't a concern here. The estimates are looking at the difference between adjacent precincts across county lines. In addition, the race was a statewide race and the push for absentee ballots was a statewide effort. It isn't clear why two precincts that are adjacent to each other and have similar political and demographic makeup should be treated differently by Democrats in producing absentee ballots for Biden. Still, I reran the estimates in the first four tables using clustering but it tends to make some of the results more statistically significant.[20]

In a sense, these results are equally consistent with more vote fraud in Republican counties rather than in Democratic counties or Democratic counties rather than Republican ones, but there have been no allegations of such fraud in Republican counties.

III. Pennsylvania

In Pennsylvania's initial ballot count, former Vice President Joe Biden leads President Trump by 81,361 votes. Biden won Allegheny and Philadelphia Counties by margins of 146,706 and 471,305 votes, and the absentee vote margins in the county were 206,505 and 310,553 votes. There was also an usually large number of provisional votes in those counties, with Biden leading by 1,489 and 9,045, respectively.

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[17] Peter Navarro, "The Immaculate Deception: Six Key Dimensions of Election Irregulaties," December 15, 2020.
[18] The Superior Court of Fulton County State Of Georgia, Trump v. Raffensperger, December 4, 2020.
https://www.democracydocket.com/wp-content/uploads/sites/45/2020/12/Trump-v.-Raffensperger.pdf
[19] Austan Goolsbee in a Tweet regarding this research wrote: "you don't seem to be clustering the standard errors at the county level and instead treating every precinct as though it is independent" (https://twitter.com/Austan_Goolsbee/status/1344361588535521280).
[20] Redoing the estimates by clustering them by county pairing, doesn't fundamentally alter the results. The coefficient for county fraud is still not statistically significant in redoing Table 1, with a significance level of 0.035 percent. The t-statistic for Table 2 is 0.31 (probability for a two-tailed t-test = 0.79), for Table 3 it is 4.08 (probability for a two-tailed t-test = 0.055), and for Table 4 it is 0.50 (probability for a two-tailed t-test = 0.664).

A number of concerns are raised about possible vote fraud in both counties. Republican poll watchers have complained that they were too far away from the ballots to meaningfully observe the process.[21] The president's lawyers say that in Pittsburgh and Philadelphia, voters with invalid mail-in/absentee ballots received a notification and were allowed to correct that defect by using a provisional ballot on Election day, whereas election officials in Republican-leaning counties followed election law more strictly and did not give similar notifications to voters with invalid mail-in/absentee ballots.[22] Complaints also arose from voters being required to cast provisional votes because they were identified as having requested a mail-in ballot even though the voter claimed that they had not done so.[23] That raises concerns that someone else other than the registered voter may have voted using that person's absentee ballot.

While there are sworn affidavits attending to these problems, an open question has been whether the level of problems was significant enough to alter the election outcome.

To examine that, I used the same approach with precinct-level data that I did for Georgia. I collected data from adjacent precincts in Allegheny County and the four Republican counties that border it: Beaver, Butler, Washington, and Westmoreland. The comparison is made between Allegheny and these four other counties as well as between these four counties where they are adjacent each other. However, unlike Georgia, I could only obtain the breakdown of absentee and provisional voting for Allegheny County in 2020, so these estimates will look at only the relationship in that year. While large scale fraud is alleged in Philadelphia County, there are no Republican counties adjacent to it for me to use in a test.

The precincts in these Pennsylvania counties cover very small, fairly homogenous areas. Allegheny County has 1,323 precincts – a different precinct on average every half mile. The more rural less populous counties also have a large number of precincts: Westmoreland 307, Washington 180, Beaver 128, and Butler 111.[24]

The results in Table 5 show that in 2020, Trump's percentage of absentee votes was lower in Allegheny County border precincts than in the precincts just across the street in neighboring counties. Trump's share was just 0.25 percentage points lower on the Allegheny County side, and the difference was not statistically significant.

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[21] Shan Li and Corinne Ramey, "What Are Election Observers? Role at Crux of Trump Lawsuits in Pennsylvania," Wall Street Journal, November 10, 2020 (https://www.wsj.com/articles/what-are-election-observers-the-role-at-the-crux-of-trump-lawsuits-in-pennsylvania-11605053759). Daniel Payne, "Pennsylvania poll watcher: 'We literally had no input and no ability to watch anything'," Just the News, November 9, 2020 (https://justthenews.com/politics-policy/elections/pennsylvania-poll-watcher-we-literally-had-no-input-and-no-ability-watch).

[22] Rudy Giuliani, "Trump Campaign News Conference on Legal Challenges," C-SPAN, November 19, 2020 (https://www.c-span.org/video/?478246-1/trump-campaign-alleges-voter-fraud-states-plans-lawsuits).

[23] Complaint filed in Trump v Boockvar et al in the United States District Court for the Middle District of Pennsylvania (p. 48).

[24] https://www.butlercountypa.gov/DocumentCenter/View/1982/Precincts-List?bidId=

To the extent that one believes that there is fraud in in-person voting, the estimates here will underestimate the amount of fraud in absentee ballots.[25]

Because of aforementioned concerns with provisional ballots being offered to solve problems with absentee ballots in Allegheny and Philadelphia Counties, I also used the same test ~~to~~ we have been using to examine them.

Table 6 is the same as Table 5, except it applies to provisional, rather than absentee, votes. The estimate implies a 3.6 percentage point lower rate for Trump in the adjacent precincts in Allegheny County, but the result is not statistically significant. But there is a possible reason for this. There are a lot fewer observations as 53 of the 87 observations have no provisional ballots for Trump and, since one cannot divide by zero, those observations are not defined.[26]

Another way to look at the problem that avoids the loss of these observations is to look at the rate that provisional ballots were used in Allegheny versus the Republican counties. In that case, there is a very clear difference. 1.5% of the votes in border precincts on the Allegheny side involve provisional ballots, which is 3.2 times the 0.48% in the adjacent precincts in the surrounding counties, and that difference is statistically significant at more than the 0.1% level for a two-tailed t-test.[27]

Table 7 looks at the difference in the percent of Biden's votes from provisional ballots in the adjacent precincts after accounting for the same difference for Trump. The share of Biden's votes from provisional ballots is about 0.65 percentage points higher in Allegheny County than in the adjacent precincts, that is about 2,800 more votes for Biden. If the same pattern occurred in Philadelphia, that would be another 3,925 votes.

Again, as a control, I tried running this for Georgia. Given that the claim about warning voters to correct defects in absentee by using a provisional ballot was not applicable to Georgia, one would not expect a statistically significant result for that state. Indeed, those results are positive and statistically insignificant with a t-statistic of only 0.27.

Adding the results together, there are at least 6,700 extra ballots given to Biden. This is only a fraction of Biden's vote margin in the state – about 8.3% of that margin.

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[25] Republicans argue that there is some reason for concern. Pennsylvania has had convictions as recently as this year in Philadelphia where a Philadelphia Judge of Elections was charged with election fraud for allegedly stuffing ballot boxes on behalf of Democratic candidates in three different races (Katie Meyer, "Philly judge of elections pleads guilty to election fraud, accepting bribes," WHYY NPR, May 21, 2020 (https://whyy.org/articles/philly-judge-of-elections-pleads-guilty-to-election-fraud-accepting-bribes/).). The president's lawyer, Rudy Giuliani, has also claimed that people from New Jersey illegally voted in Philadelphia (Rick Sobey, "Rudy Giuliani claims Trump campaign has found nationwide Democrat voter fraud conspiracy plot," Boston Herald, November 19, 2020 (https://www.bostonherald.com/2020/11/19/rudy-giuliani-trump-campaign-has-found-nationwide-voter-fraud-conspiracy-plot/)).

[26] I also ran this regression using the Georgia data, but there were so few places with provisional ballots there were only 12 observations and the Fulton County Effect variable was omitted from the regression.

[27] The rate is slightly higher for the entire county: 1.98%.

Finally, I redid the results from Tables 5, 6, and 7A with data from Polidata on the racial demographics of voting age populations in these precincts. While information on gender wasn't available, data from the 2010 Census was available on the difference between the precincts in the percent of the voting age population that are black, Hispanic, and Asian. The results are similar to what were shown before, though the estimate that corresponds to Table 5 is now statistically significant at the 10 percent level for a one-tailed t-test and the estimate corresponding to Table 7A remains significant.

Overall, the results for Sections II and III show some weak but inconsistent evidence of vote fraud.

IV. Voter Turnout Rate

One objection to the preceding results is that even though the results accounted for three types of differences between precincts (geography as they are across the street from each other, the difference in the in the in-person vote share for Trump to account for other political differences, and demographic variables), there still might be some other difference associated with county lines that might explain the difference in how absentee ballots were voted in 2020. It isn't obvious what that difference would be since the push for absentee ballots by Democrats appears to have been a state and national level effort. If you had two adjacent precincts next that are the same in terms of support for Trump and demographics, it isn't clear why Democrats wouldn't try to get absentee votes from both precincts. Still, even if such a factor might exist that is independent of fraudulent activity, providing another qualitatively different test might help make that alternative explanation less plausible.

Vote fraud can increase voter turnout rate. Increased fraud can take many forms: higher rates of filling out absentee ballots for people who hadn't voted, dead people voting, ineligible people voting, or even increased payments to encourage legally registered people to vote. The increase might not be as large as the fraud if votes for opposing candidates are either lost, destroyed, or replaced with ballots filled out for the other candidate. There is no evidence that affidavits regarding vote fraud were systematically encouraged based on where Democratic voter turnout had increased the most.

For example, a court case in Georgia Fulton County Superior Court by State Republican Chairman David Shafer and President Donald Trump discovered hundreds of thousands of extra votes: 40,279 people who had moved counties without re-registering; 4,926 voters who had registered in another state after they registered in Georgia; 305,701 people who, according to state records, applied for an absentee ballot past the deadline; 66,247 under 17 years of age, 2,560 felons, 8,718 who were registered after they were dead, and 2,423 who were not on the state's voter rolls.[28]

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[28] Donald J. Trump and David J. Shafer v Brad Raffensperger et al, Fulton County Superior Court, December 4, 2020 (https://cdn.donaldjtrump.com/public-files/press_assets/verified-petition-to-contest-georgia-election.pdf).

In Nevada, over 42,000 voted more than once.[29] Jesse Banal, the lead counsel for the Trump Campaign in testimony before the Senate Hearing on Election Security and Administration, compiled this list by reviewing voter registration lists and finding the same name, address, and birthdate for registered voters. In some cases, two registrants might have the same last name, same birthdate, and same address, but one is "William" and the other "Bill." Over 1,500 dead people allegedly voted. Another 19,000 people who voted didn't live in the state (this doesn't include military voters or students). Over 1,000 listed non-existent addresses.

Similarly, in Madison and Milwaukee, Wisconsin, 28,395 people allegedly voted without identification. Republican lawyers claimed that 200,000 absentee ballots did not have the proper signatures to be allowed to be counted.[30] Payments to Native Americans to vote were supposedly "orchestrated by the Biden campaign . . . [with] Visa gift cards, jewelry, and other 'swag.'"[31]

Another reason for a higher turnout could be because of a much lower absentee rejection rate. Ballotpedia notes that in the 2016 general election 6.42% of Georgia's absentee ballots were rejected, but that rate was only 0.60% in 2020 – that is a difference of about 76,971 votes.[32] Other swing states also saw a drop, though they were much smaller than Georgia's. Pennsylvania's went from 0.95% in 2016 to 0.28% in 2020 – a difference of 17,361 votes.[33],[34]

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[29] Senate Hearing on Election Security and Administration, December 16, 2020 (https://www.c-span.org/video/?507292-1/senate-hearing-election-security-administration).
[30] Senate Hearing on Election Security and Administration, December 16, 2020 (https://www.c-span.org/video/?507292-1/senate-hearing-election-security-administration).
[31] Peter Navarro, "The Immaculate Deception: Six Key Dimensions of Election Irregulaties," December 15, 2020. Paul Bedard, "Pro-Biden effort offered Native Americans $25-$500 Visa gift cards and jewelry to vote," Washington Examiner, December 3, 2020 (https://www.washingtonexaminer.com/washington-secrets/pro-biden-effort-offered-native-americans-25-500-visa-gift-cards-jewelry-to-vote).
[32] "Election results, 2020: Analysis of rejected ballots," Ballotpedia, December 23, 2020 (https://ballotpedia.org/Election_results,_2020:_Analysis_of_rejected_ballots). The number of absentee ballots cast (1,322,529) is from the Georgia Secretary of State's website (https://sos.ga.gov/index.php/elections/number_of_absentee_ballots_rejected_for_signature_issues_in_the_2020_election_increased_350_from_2018).
[33] The number of absentee ballots cast in Pennsylvania for Biden and Trump were obtained from Pennsylvania's Secretary of State (https://www.electionreturns.pa.gov/General/SummaryResults?ElectionID=83&ElectionType=G&IsActive=1).
[34] While it isn't necessary for the results shown here, a higher turnout rate could also show up from the manufacturing of false ballots. A possible example occurred in Atlanta, where, as noted, election officials ordered ballot-counting stopped because of a water leak. (Frank Chung, "Slow leak': Text messages cast doubt on Georgia officials' 'burst pipe' excuse for pause in counting," News.com, November 12, 2020 (https://www.news.com.au/world/north-america/us-politics/slow-leak-text-messages-cast-doubt-on-georgia-officials-burst-pipe-excuse-for-pause-in-counting/news-story/19176f5113512210517c82debe684392).) The officials told observers that the vote-counting would start up again in the morning. Then once poll watchers, observers, and the media left, the vote-counting continued with surveillance video caught large boxes of ballots pulled out from underneath a draped table. ("Trump Campaign lawyers present video 'evidence' of ballot fraud," Senate Judiciary Subcommittee, December 4,2020. https://www.youtube.com/watch?v=LJ0xDWhWUxk) On the other hand, Fulton County Elections Director Richard Barron, a Democrat, claims that no one was asked to leave

Nevada's dropped by 0.6 percentage points – 4,143 votes. The only other swing state that Ballotpedia proves an estimate of rejected absentee ballots for was Michigan, and their rate was essentially unchanged from 2016 to 2020, falling from 0.49% to 0.46%.

On the other hand, some aspects of vote fraud can reduce voter turnout. In Arizona, Republican Plaintiffs in the United States District Court for the District of Arizona claim that up to 94,975 voters returned absentee ballots that were marked as unreturned.[35] Peter Navarro's election report describes these lost or destroyed ballots as "consistent with allegations of Trump ballot destruction."[36]

To test whether counties in which fraud was alleged had higher turnout rates, I take the voter turnout rates for the 2016 and 2020 general elections by county for the swing states: Arizona, Florida, Georgia, Michigan, Nevada, North Carolina, Ohio, Pennsylvania, and Wisconsin. The question was whether there was a larger increase in turnout rates for the counties in which vote fraud was alleged relative to other counties. The counties claimed to have had vote fraud are the ones already discussed for Georgia (Fulton and DeKalb) and Pennsylvania (Allegheny, Centre, Chester, Delaware, Montgomery, Northampton, and Philadelphia). For Arizona (Apache, Coconino, Maricopa, and Navajo),[37] Michigan (Wayne), Nevada (Clark and Washoe),[38] and Wisconsin (Dane, Menominee, and Milwaukee)[39].

To account for differences in county turnout rates, I account for that county's turnout rate when Trump ran in 2016 and how heavily Republican or Democrat the counties are based on whether they voted for Trump or Biden. I classify those counties that Trump carried as Republican counties and Biden's ones as Democratic ones. Since the turnout change may differ

and that observers decided on their own to leave the building in Atlanta. (Staff, "Surveillance Tape Of Vote Counting Breeding False Fraud Claims In Georgia," Associated Press, December 4, 2020 (https://www.huffpost.com/entry/video-georgia-election-false-fraud_n_5fcac976c5b619bc4c330575?guccounter=1&guce_referrer=aHR0cHM6Ly9kdWNnZHVja2dvLmNvbS8&guce).) Similarly, Gabriel Sterling, Georgia's voting system implementation manager, says that even if political observers weren't present, Georgia Secretary of State investigators were present. (Twitter post by (https://twitter.com/GabrielSterling/status/1334825233610633217?s=20).)

[35] See the United States District Court for the District of Arizona, Tyler Bowyer et al v.. Doug Ducey, December 2, 2020 . https://www.democracydocket.com/wp-content/uploads/sites/45/2020/12/Bower-Complaint-AZ.pdf

[36] Peter Navarro, "The Immaculate Deception: Six Key Dimensions of Election Irregulaties," December 15, 2020.

[37] John Davidson, "In Nevada, A Corrupt Cash-For-Votes Scheme Is Hiding In Plain Sight," The Federalist, November 18, 2020 (https://thefederalist.com/2020/11/18/in-nevada-a-corrupt-cash-for-votes-scheme-is-hiding-in-plain-sight/), (https://web.archive.org/web/20201109232825/https:/twitter.com/ITCAOnline/status/1319745575064162304), Anna V. Smith, "How Indigenous voters swung the 2020 election," High Country News, November 6, 2020 (https://www.hcn.org/articles/indigenous-affairs-how-indigenous-voters-swung-the-2020-election).

[38] Paul Bedard, "Pro-Biden effort offered Native Americans $25-$500 Visa gift cards and jewelry to vote," Washington Examiner, December 3, 2020 (https://www.washingtonexaminer.com/washington-secrets/pro-biden-effort-offered-native-americans-25-500-visa-gift-cards-jewelry-to-vote).

[39] Scott Bauer, "Wisconsin issues recount order in 2 counties as Trump wanted," Associated Press, November 19, 2020 (https://apnews.com/article/wisconsin-recount-2-counties-f408a7b43deb96e2ac7ff0b24a2f968a). See also https://web.archive.org/web/20201111220325/https://www.facebook.com/permalink.php?story_fbid=1539297286270372&id=573103029556474.

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for Democratic and Republican counties, I separate the counties where Trump and Biden won with two separate variables. When Biden won a county, the values for the Republican variable are zero. Similarly, when Trump won, the values for the Democratic variable are zero. Elsewhere those variables equal Trump's share of the vote minus Biden's share. Since I have no expectation of whether a change in turnout was linear with respect to how partisan the county was, I also tried including the square of these measures of how partisan these counties were (see Table 9).

I also used data from the U.S. Census Bureau's 2019 American Community Survey on median household income as well as the percent of the population that is female, different racial groups, by highest level of education, and the age groupings as provided by the Census.

The estimates in Table 10 start from the simplest specification to one with more controls, and they imply that the counties where vote fraud is alleged had between 147,000 and 289,000 excess votes. In each case, the county fraud variable's coefficient is statistically significant at least at the 5 percent level for a one-tailed t-test.

The first specification shows that the more heavily Republican a county was, the larger the increase in voter turnout rate over 2016. The opposite is true for more heavily Democratic counties, but that effect is statistically insignificant. The F-test shows Democratic and Republican counties behaved very differently in terms of voter turnout rates. The turnout rate in 2016 by itself explains about half the variation in 2020 voter turnout.

The next estimate looks at both how Democratic or Republican counties are as well as those values squared. Again, the voter turnout rate increased the most in the Republican counties and didn't change in the Democratic ones. While the coefficients for the Republican counties on Trump's win margin and that margin squared weren't individually statistically significant, the F-test shows that they are jointly statistically significant at better than the one percent level.

The following two specifications include the Census information for the counties. Still, they show what should be pretty obvious: Census data on income, race, gender, age, and education are highly correlated with measures of how partisan a county is. When I include the Census data, the Republican partisanship measures are no longer statistically significant, even for the joint F-test. Including all the additional factors explains virtually nothing more in the percent of the variation in turnouts (the R-squares only increase by about one or two percentage points and the difference in adjusted R-squares is even smaller).

The difference in the two specifications involves whether I include the percent of the population that is Native American. Given that the vote-buying schemes were directly related to Native Americans, both the percent of the population that is Native American and the county fraud variable will be highly correlated. The county fraud variable in the fourth specification will thus undercount the impact of vote fraud in that county. The third and fourth estimates imply that there was between a 1.26 and 2.42 percent unexplained increase in voter turnout in counties where fraud was alleged – the equivalent of 150,000 to 289,000 more votes.

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In Table 11, I reran the regressions in Table 10 on just the two states that we examined in the earlier sections of this – Georgia and Pennsylvania – as well as the control states swing state (Florida, North Carolina, and Ohio), and the results were slightly larger and consistently statistically significant at around the 5 percent level for a one-tailed t-test. The estimates on the county fraud variable implied excess votes of between 1.37 and 1.53 percent, or about 70,000 to 79,000 votes. The total combined win margin for Biden in Georgia and Pennsylvania was 92,334. Again, my estimates are an underestimate of the fraud if votes for opposing candidates are either lost, destroyed, or replaced with ballots filled out for the other candidate.

V. Conclusion

The precinct level estimates for Georgia and Pennsylvania indicate some vote fraud, but the size and statistical significance of the effects is inconsistent. The voter turnout rate data provides stronger evidence that there are significant excess votes in Arizona, Michigan, Nevada, and Wisconsin as well. While the problems shown here are large, there are two reasons to believe that they are underestimates: 1) the estimates using precinct level data assume that there is no fraud occurring with in-person voting and 2) the voter turnout estimates do not account for ballots for the opposing candidate that are lost, destroyed, or replaced with ballots filled out for the other candidate.

Table 1: 2016 Difference in Trump's share of the Absentee Ballot Vote between adjacent precincts at the border of Fulton, Carroll, Cherokee, Coweta, and Forsyth Counties

Control variables	Coefficient	Absolute t-statistic	Level of statistical significance for a two-tailed t-test
Difference in Trump's percent of the two-candidate in-person vote between two precincts	0.8592	5.19	0.0000
Fulton County Effect	-0.02469	0.65	0.522
Number of Observations 24	F-statistic = 29.04 Level of significance = 0.0000	R-Squared = 0.7253	

Table 2: 2020 Difference in Trump's share of the Absentee Ballot Vote between adjacent precincts at the border of Fulton, Carroll, Cherokee, Coweta, and Forsyth Counties

Control variables	Coefficient	Absolute t-statistic	Level of statistical significance for a two-tailed t-test
Difference in Trump's percent of the two-candidate in-person vote between two precincts	0.6059	7.84	0.0000
Fulton County Effect	-0.00282	0.14	0.891
Number of Observations 22	F-statistic = 58.50 Level of significance = 0.0000	R-Squared = 0.8540	

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Table 3: 2020 Difference in Trump's share of the Absentee Ballot Vote after adjusting for Racial and Gender Demographics of Registered voters			
Control variables	Coefficient	Absolute t-statistic	Level of statistical significance for a two-tailed t-test
Fulton County Effect	-0.1153	2.89	0.011
Difference in the percent of voters who are black males	1.6396	0.65	0.528
Difference in the percent of voters who are black females	-1.8755	1.07	0.300
Difference in the percent of voters who are Hispanic males	-4.4266	1.35	0.196
Difference in the percent of voters who are Hispanic females	2.7631	0.88	0.394
Difference in the percent of voters who are Asian males	1.1089	0.64	0.534
Difference in the percent of voters who are Asian females	-2.3922	1.22	0.241
Number of Observations 22	F-statistic = 7.48 Level of significance = 0.0006	R-Squared = 0.7774	

Table 4: 2020 Difference in Trump's share of the Absentee Ballot Vote after adjusting for Racial and Gender Demographics of Registered voters and the difference in the in-person vote			
Control variables	Coefficient	Absolute t-statistic	Level of statistical significance for a two-tailed t-test
Difference in Trump's percent of the two-candidate in-person vote between two precincts	0.8846	4.79	0.0000
Fulton County Effect	-0.0225	0.58	0.568
Difference in the percent of voters who are black males	-0.5052	0.30	0.768
Difference in the percent of voters who are black females	0.8265	0.66	0.519
Difference in the percent of voters who are Hispanic males	-3.5121	1.68	0.116
Difference in the percent of voters who are Hispanic females	3.7800	1.87	0.082
Difference in the percent of voters who are Asian males	0.33894	0.30	0.767
Difference in the percent of voters who are Asian females	-0.9173	0.71	0.487
Number of Obs = 22	F-statistic = 18.98 Level of significance = 0.0000	R-Squared = 0.9156	

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Table 5: 2020 Difference in Trump's share of the Absentee Ballot Vote between adjacent precincts at the border of Allegheny, Beaver, Butler, Washington, and Westmoreland Counties			
Control variables	Coefficient	Absolute t-statistic	Level of statistical significance for a two-tailed t-test
Difference in Trump's percent of the two-candidate in-person vote in the adjacent precincts	0.3068	4.68	0.0000
Allegheny County Effect	-0.0025	0.29	0.770
Number of Observations 87	F-statistic = 11.16 Level of significance = 0.0000	R-Squared = 0.2080	

Table 6: 2020 Difference in Trump's share of the Provisional Ballots between adjacent precincts at the border of Allegheny, Beaver, Butler, Washington, and Westmoreland Counties			
Control variables	Coefficient	Absolute t-statistic	Level of statistical significance for a two-tailed t-test
Difference in Trump's percent of the two-candidate in-person vote in the adjacent precincts	1.0554	1.91	0.065
Allegheny County Effect	-0.0362	0.82	0.417
Number of Observations 34	F-statistic = 3.13 Level of significance = 0.0571	R-Squared = 0.1638	

Table 7: 2020 The Difference in the share of Biden's votes from provisional ballots in adjacent precincts			
A) Examining Allegheny, Beaver, Butler, Washington, and Westmoreland Counties			
Control variables	Coefficient	Absolute t-statistic	Level of statistical significance for a two-tailed t-test
Difference in the share of Trump's votes from provisional ballots in the adjacent precincts	0.3855	3.76	0.000
Allegheny County Effect	0.0065	2.73	0.008
Number of Observations 87	F-statistic = 38.71 Level of significance = 0.0000	R-Squared = 0.4767	
B) Examining Fulton, Carroll, Cherokee, Coweta, Fayette, and Forsyth Counties			
Difference in the share of Trump's votes from provisional ballots in the adjacent precincts	-0.1442	0.30	0.772
Fulton County Effect	0.0312	0.27	0.795
Number of Observations 22	F-statistic = 23.60 Level of significance = 0.0000	R-Squared = 0.7130	

Table 8: Re-estimating Tables 5, 6, and 7A by including Census 2010 Precinct Demographic data on Difference in the percent of the voting age population who are Black, Hispanic, and Asian				
Regression Estimate	Coefficient on the Allegheny County Effect	Absolute t-statistic	Level of statistical significance for a two-tailed t-test	
Table 5	-0.0125	1.40	0.166	Number of obs = 87 F-statistic = 6.61 Level of significance F-test = 0.0000 R-square = 0.2871
Table 6	-0.04196	0.90	0.376	Number of obs = 34 F-statistic = 2.70 Level of significance F-test = 0.0400 R-square = 0.3180
Table 7A	0.0057	2.14	0.036	Number of obs = 87 F-statistic = 15.13 Level of significance F-test = 0.0000 R-square = 0.4798

Table 9: Comparing Voter Turnout Rates in 2020 Swing States (Arizona, Florida, Georgia, Michigan, Nevada, North Carolina, Ohio, Pennsylvania, and Wisconsin)			
Variable	Observations	Mean	Standard Deviation
Percent Voter Turnout in 2020 Election	668	.7502149	.0704998
Percent Voter Turnout in 2016 Election	668	.6979785	.0757554
Republican Counties (Trump's minus Biden's share of votes)	668	.18628	.21074
Republican Counties (Trump's minus Biden's share of votes squared)	668	.0790	.1228
Democrat Counties (Trump's minus Biden's share of votes)	668	-.1369	.200619
Democrats Counties (Trump's minus Biden's share of votes squared)	668	.05894	.10930
County where Fraud alleged	668	.02844	.1664

Table 10: Did Counties Accused of Fraud have an unusual increase in Voter Turnout? (Arizona, Florida, Georgia, Michigan, Nevada, North Carolina, Ohio, Pennsylvania, Wisconsin) (absolute t-statistics and the level of significance for a two-tailed t-test are in parentheses)				
Control variables	(1)	(2)	(3)	(4)
County where Fraud alleged	.0124 (1.96, 0.050)	.0123 (1.95, 0.052)	.02423 (3.66, 0.000)	.0126 (1.78, 0.076)
Republican Counties (Trump's minus Biden's share of votes)	0.0149 (2.39, 0.017)	.0129 (0.62, 0.538)	.00317 (0.15, 0.881)	.0047 (0.23, 0.821)
Republican Counties (Trump's minus Biden's share of votes squared)		.0097 (0.32, 0.746)	.01004 (0.33, 0.741)	.0099 (0.33, 0.740)
Joint F-test for Republican Counties		F-test = 4.02	F-test = 0.74	F-test = 0.99
Democrat Counties (Trump's minus Biden's share of votes)	0.0152 (0.23, 0.816)	-.0255 (1.03, 0.301)	-.0130 (0.54, 0.592)	-.0135 (0.56, 0.573)
Democrats Counties (Trump's minus Biden's share of votes squared)		-.0493 (1.28, 0.202)	-.03517 (0.94, 0.350)	-.0340 (0.92, 0.359)
F-test for how turnout rates vary differently between heavily Democratic and Republican counties	F-test = 8.18			
Joint F-test for Democrat Counties		F-test = 1.01	F-test = 0.99	F-test = 0.83
Percent Voter Turnout in 2016 Election	.8653 (62.50, 0.00)	.8661 (62.51, 0.00)	.8090 (46.16, 0.00)	.8060 (46.53, 0.00)
Median household income			2.34e-07 (1.18, 0.238)	4.03e-07 (2.01, 0.044)
Percent Female			.0549 (0.91, 0.364)	.1044 (1.72, 0.087)
Percent Black			-.0112 (-1.12, 0.262)	-.006256 (0.63, 0.529)
Percent Hispanic or Latino			-.03530 (2.27, 0.023)	-.03268 (2.13, 0.034)
Percent Asian			-.29899 (2.94, 0.003)	-.25397 (2.52, 0.012)
Percent Native American				.09038 (4.14, 0.000)
Percent Two or more races			-.4854 (4.46, 0.000)	-.543089 (5.01, 0.000)
Percent High School Graduate			-.0775 (1.98, 0.048)	-.0717 (1.85, 0.064)
Percent Some College or Associate			-.06118 (1.62, 0.105)	-.0706 (1.89, 0.059)

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Percent Bachelor's Degree			.06025 (1.04, 0.301)	.054079 (0.94, 0.347)
Percent Graduate or Professional			-.10699 (1.52, 0.129)	-.12516 (1.80, 0.072)
Joint F-test for Census Age Groups			F-test = 3.72	F-test = 1.57
Constant	.1433 (14.30, 0.00)	.1416 (13.60, 0.00)	.16232 (2.11, 0.035)	.06437 (0.81, 0.418)
Number of Observations = 668	F-stat = 983.11 R2 = 0.8557	F-stat = 656.27 R2 = 0.8563	F-stat = 128.44 R2 = 0.8767	F-stat = 128.53 R2 = 0.8800

Table 11: Focusing on Voter Turnout in Georgia and Pennsylvania. Using the specifications shown in Table 10, though not all results are reported. (Florida, Georgia, North Carolina, Ohio, Pennsylvania) (absolute t-statistics and the level of significance for a two-tailed t-test are in parentheses)				
Control variables	(1)	(2)	(3)	(4)
County where Fraud alleged	.01370 (1.53, 0.050)	.01532 (1.71, 0.087)	.01469 (1.63, 0.104)	.01454 (1.61, 0.108)