

Graphical evidence that the infamous “butterfly ballot” of Palm Beach County in Florida confused many voters

Voting Irregularities in Palm Beach, Florida

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Background

By the time you read this a new president will occupy the White House. Ordinarily that is a fairly pedestrian statement but there was nothing ordinary about the 2000 presidential election. At the writing of this note (a week after the election) the ultimate outcome is still unknown, tied up in a battle over manual recounting of ballots.

One of the most intriguing aspects of the election in Florida is the now infamous “butterfly ballot” of Palm Beach County, a picture of which is provided in Figure 1. Many voters claimed that they were confused by the ballot structure and may have inadvertently voted for Buchanan when in fact they intended to vote for Gore. Note that Gore is the second name on the left but that the second punch hole corresponds to Buchanan. The event prompted a discussion among some friends and colleagues about whether the results could be easily detected by examining the data, since Palm Beach County alone had the unusual ballot structure in Florida. That is the genesis of this note.

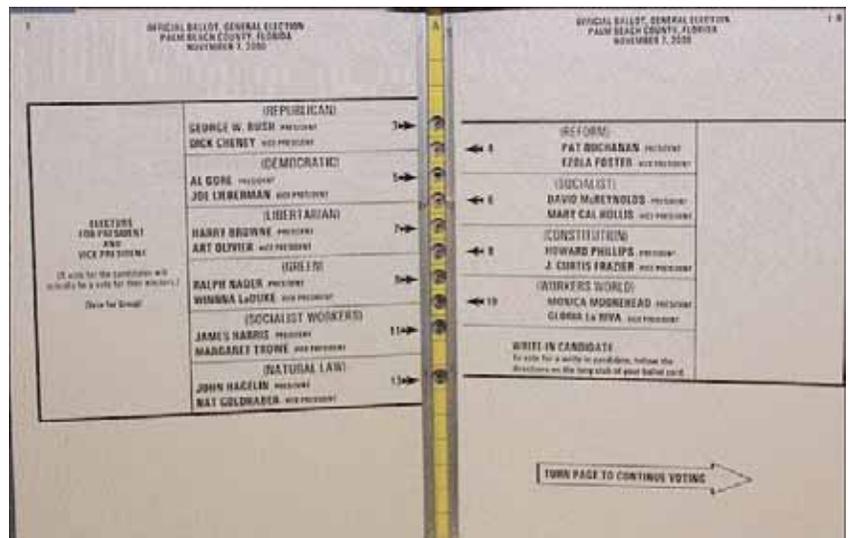


Figure 1. The butterfly ballot of Palm Beach County, Florida.

A First Look at the Data

Of course in the internet age there is no shortage of data. Chris Fastnow, a political scientist at Chatham College, was one of those involved in the Palm Beach discussions. Just hours after the elec-

tion, she found the Florida county-level returns for the election at the CBS News website and passed them on to me (I have since updated the data with those from the state of Florida’s website).

We reasoned that if enough voters in Palm Beach County were confused and

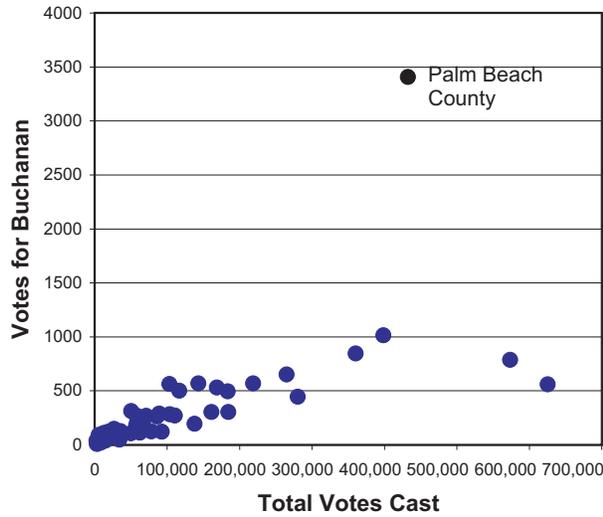


Figure 2. Presidential election results for Florida showing the votes cast for Buchanan and the total votes cast by county.

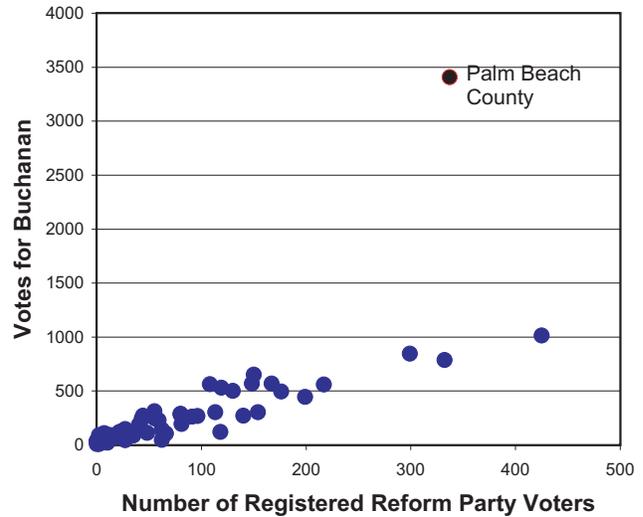


Figure 3. Presidential election results for Florida showing the votes cast for Buchanan and the number of registered Reform Party voters by county.

mistakenly voted for Buchanan, it should be detectable by examining the vote for Buchanan relative to the total votes cast for all of the counties in Florida. Figure 2 provides a scatter plot of these data. With 3407 votes for Buchanan, Palm Beach County appears as a clear outlier. Of course, not all counties are the same. Perhaps, for instance, Palm Beach stands out because it has more Reform Party members. Figure 3 indicates that there are in fact more Reform Party voters in Palm

Beach than most other Florida counties (as Palm Beach has a large population there are more of every kind of voter!) but the Buchanan vote still looks like an outlier.

By simple visual inspection, extrapolating from the pattern seen in the other Florida counties in Figures 2 and 3, it appears that instead of the 3407 votes Buchanan received in Palm Beach County, we would expect him to receive under 1000 votes. I discuss this a bit more below.

An Unexpected Consequence

I drafted a quick note about this data analysis and emailed my department about the graphs, which I had posted to the web (madison.hss.cmu.edu). A colleague suggested that my short research note be made “public,” and my initial email to colleagues spread across the university and onward, prompting a string of phone calls, emails, and so forth. Ever since, I have been overwhelmed

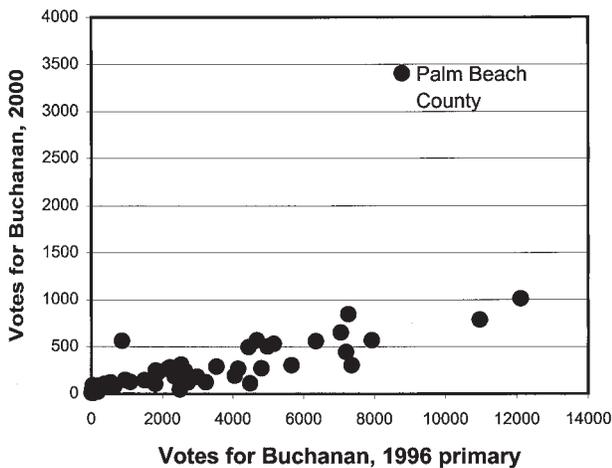


Figure 4. Buchanan votes in the 2000 election and in the 1996 Republican presidential primary for Florida counties.

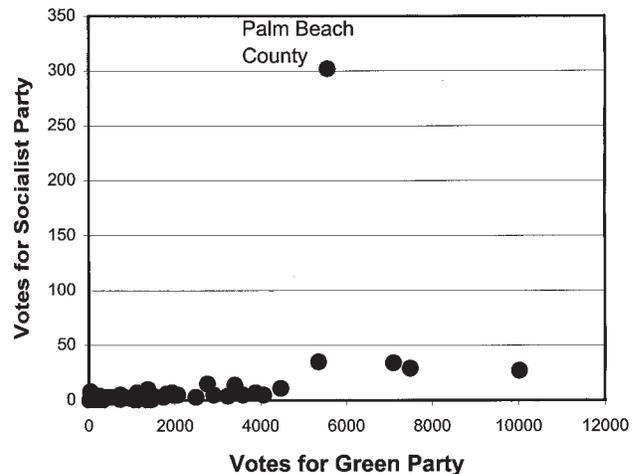


Figure 5. Presidential election results for Florida showing the votes cast for the Socialist Party candidate and the number of Green Party votes by county.

with more messages than I can possibly handle. A number of other political scientists and researchers from a variety of disciplines have also examined these and related data. Some interesting links are provided at my website; a subset is listed below as Additional Reading.

Estimating the Effect of the Butterfly Ballot

Ultimately more and more relevant data have been unearthed. These help address a variety of competing explanations for the results we have seen. For example, perhaps there is support for Buchanan outside the Reform Party (after all he just joined that party this year). Figure 4 (see previous page) shows a scatterplot of Buchanan's votes in the 2000 election and Buchanan's votes in the 1996 Republican primary election. Palm Beach is an outlier here too, so it does not appear to be the case that this is real Buchanan support. Other researchers (at some of the sites below) have integrated precinct level data from Florida and beyond.

The three plots (Figures 2–4) all suggest that one would expect, based on existing patterns in other Florida counties, for Buchanan to have garnered between 500 and 1000 votes in this election. This leaves an excess of more than 2000 that quite plausibly were intended for Al Gore. As of this writing, the difference between the two candidates is fewer than 500 votes.

A number of the analyses that have been done have used the statistical method of linear regression to fit a line to the scatterplots and thereby make forecasts for the expected number of votes. Such models also allow for the formation of upper limits on what might reasonably be expected. Some of these regressions are reported at my website. I don't report them here because there are number of problems with applying the simple linear regression model for these data. For example, one should take into account the different populations of the counties (such as by weighting the observations or by transforming the vote totals via logarithms), but these adjustments make interpretation more difficult. For this note I restrict attention to the striking graphical displays.

More Evidence About the Butterfly Ballot

Supporters of Gore pointed to another likely consequence of the confusing ballot. More than 19,000 ballots were disqualified in Palm Beach County for having votes for more than one presidential candidate (or for having none). Many of the so-called "over-vote" ballots are said to have been punched for both Gore and Buchanan, most likely due to voters realizing that they had voted for Buchanan in error and then tried to fix the ballot.

Figure 5 (see previous page) presents some data that have not been discussed much by the public; the votes received by the Socialist Party in each county are shown along with the votes for another left-leaning party, the Green Party. Palm Beach is an equally remarkable outlier here. Why? A closer look at the butterfly ballot indicates that like Buchanan, the Socialist Party candidate is on the right-hand side of the ballot (positioned between Al Gore and the Libertarian Party candidate Harry Brown). In the rest of Florida, Libertarian votes outnumbered Socialist votes 50-to-1, but in Palm Beach the ratio was just over 2-to-1. Though not of great consequence to the outcome of election 2000, the pattern here is further evidence of the difficulty voters had with this ballot.

Summary

If Buchanan's unusually strong Palm Beach performance can be attributed to voters who intended to vote for Gore, then it can be claimed with a fairly high degree of confidence that the mistakes cost Gore a significant number of votes. If Bush is ultimately declared the winner in Florida by a small amount, a strong claim can thus be made that the confusion over the unusual ballot structure in Palm Beach cost Gore the presidency.

Of course there are some problems with the above. For one thing, there may well have been similar events in other states and counties that have not received the same scrutiny as Florida. Also, many contest that all of these excess Buchanan voters were intended for Gore; the graphs indicate that this is a plausible conjecture, but it remains a conjecture nonetheless.

A data analysis of this type can be suggestive but cannot *prove* that the ballot structure in Palm Beach cost Gore a significant number of votes. Such a proof is impossible, because it requires eliminating all possible rival explanations, no matter how plausible or implausible they may be. We cannot rule out alternative factors, such as equally confused Bush voters or alien conspiracies. The data in this case however are quite suggestive.

Additional Reading

The following websites contain related analyses. All were created in the week following the 2000 election.

Prof. Henry Brady (Dept. of Political Science, UC Berkeley)
<http://socrates.berkeley.edu/~ucdtpums/>

Prof. Chris Carrol (Dept. of Economics, Johns Hopkins)
<http://www.econ.jhu.edu/people/ccarroll/carroll.html>

Prof. Craig Fox (Fuqua School of Business, Duke Univ.)
<http://faculty.fuqua.duke.edu/~cfox/Bio/election2000note.pdf>

Prof. Bruce Hansen (Dept. of Economics, Univ. of Wisconsin Madison)
<http://www.ssc.wisc.edu/~bhansen/vote/vote.html>

Prof. Burt Monroe (Dept. of Political Science, Indiana Univ.)
<http://www.indiana.edu/~playpol/pbmodel.pdf>

Prof. Matt Wand and others (Harvard University)
<http://elections.fas.harvard.edu/>