

EVALUATING THE IMPACT OF VOTING TECHNOLOGY ON THE
TABULATION OF VOTER PREFERENCES:
THE 2004 PRESIDENTIAL ELECTION IN FLORIDA*

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PRELIMINARY RESULTS, COMMENTS WELCOME.

*All rights reserved, copyright 2004. This is a preliminary research note that is part of a collaborative project with Jasjeet Sekhon, Walter Mebane, Jr., and Michael Herron. Materials related to this analysis and other resources are available at <http://wand.stanford.edu/elections/us/FL2004/>

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1 INTRODUCTION

The initial canvas of the Florida had Bush receiving 52 percent of the vote, receiving 381,290 more votes than Kerry. This is in contrast to the 2000 Presidential election, where the Bush's final certified margin in Florida was only 537 votes over Gore and academic studies showed the number of intended votes for Gore exceeded those for Bush. The final tally favoring Bush instead of Gore was shown to be the product of ballot format induced errors leading to incorrect votes for Buchanan instead for Gore (Wand, Shotts, Sekhon, Mebane, Herron, and Brady, 2001b) and a disproportionate number of ballots for Gore were simply not counted (Mebane, 2004c).

Although Bush's current margin of victory in Florida is ten times larger than the biases of the problems in 2000, it is important to evaluate the election to determine if old problems persisted and whether new problems have arisen. The controversial technology of 2000, punchcards and centrally tabulated optical scan machines, have been entirely replaced in the current election by either precinct based optical scans or DRE machines. Even if the winner of an election is not affected by administrative problems, it is essential to the integrity of the democratic process that problems be identified and corrected (Mebane, Sekhon, and Wand, 2004). As part of a comprehensive study of the administration of the 2004 U.S. presidential elections, Jasjeet Sekhon, Walter Mebane, Jr., Michael Herron and I have undertaken an analysis of vote returns to identify irregularities in a number of key states. This research note only addresses issues related to Florida.

This research note also presents results from only part of our overall study. To evaluate claims that particular machines, or entire classes of voting technology, affected the tabulation of voter preferences requires a comprehensive research design, such as those previously used by Wand, Shotts, Sekhon, Mebane, Herron, and Brady (2001b) to successfully establish the impact of the Butterfly ballot in the 2000 Presidential election and by Wand (2004) to address allegations of problems in the 2004 New Hampshire Democratic presidential primary.

A core challenge for an analysis that seeks to evaluate the impact of voting technology on the tabulation of voter preferences is that counties (or equivalent local jurisdictions) often have the discretion to select the technology used when holding elections. Because counties have this discretion, the allocation of technology across counties is not random. In Florida, those counties which picked optical scan technology have a different distribution of demographics than those who picked DRE machines. These differences which affect technology selection are also correlated with political preference. The differences of counties with optical scans in Florida, and difficulty of using registration data to predict presidential votes, has been pointed out

by Mebane (2004a,b). The analysis of Sekhon addresses this lack of balance between optical scan and DRE counties by matching the two groups on all other features of the counties. Sekhon finds that, after finding a comparable set of matched counties, there is no difference the vote proportion for Kerry relative to Bush as a function of having optical scan tabulations. I take a different approach that I present and discuss in the next section.

The following analysis should be considered in conjunction with the current analysis of Walter Mebane (2004a,b) and Jas Sekhon (2004), together they take a variety of approaches to answering the question: was Kerry systematically disadvantaged in the Florida vote counts when optical scan tabulation used. Given the data I currently have available, the evidence I will present leads me to conclude that there was not a systematic bias against Kerry due to a particular voting technology.

Although we do not find evidence of systematic problems across counties due to a single technology, I do not argue that there are not problems with the administration of elections in the U.S.. We learned a great deal about the pervasiveness of problems from the careful scrutiny of ballots after the 2000 Presidential election. Some of these problems have been fixed, others have not, and there are probably more which have not yet discovered or are new. In democratic elections, a primary goal should be that the preferences of all voters are accurately recorded and tabulated. To ensure public confidence that this ideal is true in practice requires a regular, rigorous, and public auditing of elections at the level of individual ballots.¹

2 SEARCHING FOR ANOMALOUS VOTES

The basic intuition which drives most analysis of election results for problems is to look for systematic deviations from what is expected. In the analysis by Dopp (2004), a model based on voting proportional to registration was used, and she noted that the deviations of the actual vote seemed to disproportionately hurt Kerry when optical scan machines were used. As was noted by Mebane (2004a), the use of registration for understanding Presidential election votes in Florida is problematic.²

The approach I adopt to calculate deviations from what is expected, is to estimate a model of the current election using both baseline historical voting behavior and measures of political change in the current

¹Arguments against audits on the basis of costs seem untenable to me when the perceived integrity of the electoral system is at stake. Relative to the enormous amount of money spent on advertising by candidates in elections, the costs would be small. The challenge of course is to decide who should fund regular audits.

² “Instead, the pattern in which counties that have high Democratic registration had high percentage increases in the vote for Bush reflects the fact that all those counties have trended strongly Republican over the past twelve years. The counties are mostly in the Florida Panhandle. Given the voting history and registration trends, these counties seem to have many old-style southern Democrats who have not bothered to change their registration.” Mebane (2004a)

election period. A statistical estimator for analyzing votes and detecting irregularities must possess a number of key properties: it must take into account (a) the heteroscedasticity due to the widely varying counties sizes in Florida, (b) the overdispersion of the aggregated vote totals due to the clustering / geographic sort of relatively homogeneous voters, and (c) the possibility that some minority of the data generated by some deviant process, such as fraudulent manipulation of the vote totals. Satisfying all these criteria, Mebane and Sekhon (2004b) developed a robust method for estimating overdispersed multinomial models of count data. The estimator identifies the bulk of the data which is assumed to be without anomalies (which could be all the data if there are no problems), and identifies those places (up to 50 percent of the data) where the vote totals are partially or entirely unlike the rest. This method of outlier detection has been applied in American elections (Mebane and Sekhon, 2004b) and comparatively in Canadian elections (Wand, Sekhon, and Mebane, 2001a). An earlier version of the model was used as part of successfully identifying the effect of the Butterfly ballot in Palm Beach County during the 2000 Presidential election (Wand et al., 2001b). Estimation is performed using statistical software written by Mebane and Sekhon (2004a)

Another virtue of this approach is that one can be agnostic about the sources of problems. One can include variables for particular voting technologies to test for mean shifts which may indicate biases. One may also simply want to examine the counties with large residuals either separately or as a cluster. It is important to emphasize that finding an anomaly in the form of a large residual is not evidence of an irregularity—that can only be determined by subsequent supplementary research. However, an outlier may help to focus our attention on where to look for problems.

A summary of the variables I use in my model, along with their component variables, are shown in Table 1. Historical voting behavior is measured by the 2000 two-party vote proportion for Gore. Shifts in the political landscape are measured by changes in registration proportions 2000 to 2004 (both change in democratic party proportion and change in proportion of unaffiliated registrants). To measure mobilization in the current election, I include a function of the number of individual contributions in each county received by the committees for each candidate.³ To measure systematic differences between optical scan and DRE technologies, we include an indicator of optical scan technology. I have also examined differences between particular models of optical scans (Optech versus Accuvote).

³ Relative contributions are specified as $(\text{Bush} - \text{Kerry}) / (\text{Kerry} + \text{Bush})$. Important caveats about contributions data: 1) Contribution data counts number of \$200+ contributions to the following committees:

2004: Kerry+(Kerry/Edwards) and Bush/Cheney ; 2004: Gore+(Gore/Lieberman) and Bush+(Bush/Cheney)

summing both primary and general election period committees. Data is for 2003-01-01 to 2004-10-13 (latest update from FEC).

2) I treat every contribution as distinct, even if same person could be identified given FEC records as a repeat donor; future work.

3) Zip codes split across counties are allocated to county which has plurality of addresses

Table 1: Summary statistics, N=67 Counties in Florida

	<i>min</i>	<i>mean</i>	<i>median</i>	<i>max</i>	<i>SD</i>
2004 Vote Dem	845.00	53327.43	18574.00	452360.00	90884.31
2004 Vote Rep	1927.00	59013.28	25874.00	358613.00	75310.07
2004 Vote %Dem	0.22	0.40	0.41	0.70	0.11
2000 Vote Dem	789.00	43453.99	14167.00	387703.00	75070.44
2000 Vote Rep	1317.00	43450.97	20206.00	289533.00	57182.62
2000 Vote %Dem	0.25	0.44	0.44	0.69	0.09
2004-2000 Δ % Regist. Dem	-0.16	-0.05	-0.04	0.01	0.04
2004-2000 Δ % Regist. Unaffil	0.01	0.03	0.03	0.05	0.01
2004 Indiv Contrib (N) Dem	0.00	118.84	20.00	1828.00	288.79
2004 Indiv Contrib (N) Rep	0.00	243.55	48.00	2372.00	442.28
2004 Indiv Contrib relative	-1.00	0.50	0.51	1.00	0.37
Optical scan	0.00	0.78	1.00	1.00	0.42
Optech	0.00	0.33	0.00	1.00	0.47
Accuvote	0.00	0.45	0.00	1.00	0.50

The analysis currently focuses on the two party vote share of Democrats and Republicans.⁴ It is important to note that all data that has been analyzed here and in all analysis I have seen uses the *total votes in each county regardless of specific method of voting*. Thus early, absentee and provisional ballots are lumped into these totals, and these methods can have different mechanisms for tabulations (most importantly for the DREs). Separating out these different types of ballots will be very important for gaining additional leverage on evaluating the impact of particular machines.

Results from the binomial two-party model are presented in Table 2. Some model searches have been done. The model presented is the best fitting (by the LQD criterion); it also includes variables which have intuitive implications. A critical variable is the relative number of contributions to each candidates committees: this observable political participation (though of an elite form) is an important predictor of changes from the previous vote proportion for Bush in 2000.⁵ The key coefficient for the current controversy is that the mean shift of the optical scan counties is both small in magnitude and statistically insignificant (-0.01 with t-statistic of -0.39).

There is only one outlier which receives no weight in the estimation: Kerry received an unusually large proportion of the vote in Duval County. The other identified counties had some of the large, but not

⁴The study of votes to third parties was critical to identify the ballot format effects in PBC during 2004, but similar types of other parties has not been alleged in the current election and will be the subject of future analysis.

⁵In some counties the number of contributions is very small, and therefore may be a very noisy indicator of preferences. I have explored zeroing the relative contributions measure for cases with small numbers of total contributions. These trimmed versions have performed much worse.

Table 2: Estimates from robust multinomial analysis of county level two party votes; Kerry versus Bush

	<i>Est</i>	<i>SE</i>	<i>t - statistic</i>
(Intercept)	-1.86	0.048	-38.90
2004 Vote %Dem	3.68	0.078	47.40
2004-2000 Δ % Regist. Dem	1.76	0.269	6.54
2004-2000 Δ % Regist. Unaffil	1.05	0.640	1.64
2004 Indiv Contrib relative	-0.19	0.027	-7.04
Optical	-0.01	0.016	-0.39

$N=67$, $\sigma_{LQD} = 7.47$

implausible residuals. The studentized residuals for each county are plotted (in alphabetical order from left to right) in Figure 1.

If there was manipulation of votes in all the optical machines and none of the DREs, then the model might fit the data from the optical machines and treat the DRE vote returns as outliers. When the majority of counties are presumed to be fine, the non-manipulated counties would look like they are the odd/manipulated. However, contrary to this logic, the only outlier (Duval) that is found is among the optical machines; the DRE data is better fit without any unusual votes.

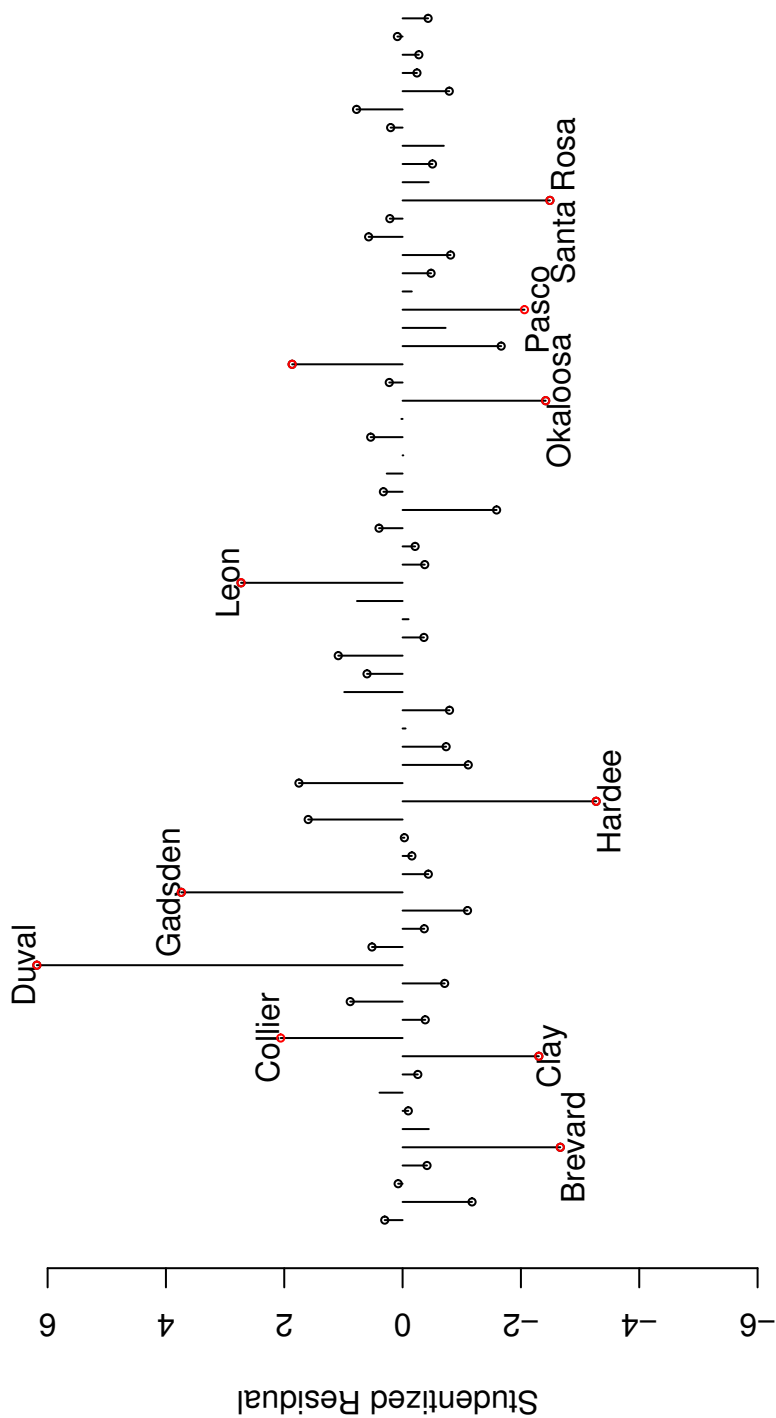


Figure 1: County level studentized residuals from basic model of Kerry votes (versus Bush) in 2004 Florida. Counties are alphabetically ordered. Dots at end of bars indicate optical scan tabulations, others are DRE tabulations. Named counties have tanh weights of less than .95, which generally accords with large studentized residuals, $|r| > 2$. $N=67$, $\sigma_{LQD} = 7.47$

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