The Wrong Man is President! Overvotes in the 2000 Presidential Election in Florida*

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Abstract

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Using ballot-level data from the NORC Florida ballots project and ballot-image files, I argue that overvoted ballots in the 2000 presidential election in Florida included more than 50,000 votes that were intended to go to either Bush or Gore but instead were discarded. The primary reason for this was defective election administration in the state, especially the failure to use systems that warn the voter when there are too many marks on the ballot and allow the voter to make corrections. If the best type of vote tabulation system used in the state in 2000—precinct-tabulated optical scan ballots—had been used everywhere in Florida, Gore would have won by more than 30,000 votes. The experience in Florida points to the need to gather ballot-level data to evaluate the success of election reform efforts now underway in much of the United States.

Introduction

The 2000 presidential election was the worst election in American history. Some may argue that the Tilden-Hayes contest of 1876 was at least as bad. In the 1876 election, not only did the winner of the Electoral College not win a plurality of the national popular vote, but fraud plagued the voting in Florida, Louisiana and South Carolina. An Electoral Commission, appointed by Congress, eventually decided the outcome and split along partisan lines to choose Hayes. In the Bush-Gore contest of 2000 the eventual winner of the Electoral College lost the popular vote by over 540,000 votes, and the Supreme Court stepped in with a decision that most view as highly politicized. As I review in this paper, examination of 2000 election ballots in the decisive state of Florida shows that a plurality of the voters there intended to vote for the Democrat, Al Gore, and not the Republican, George W. Bush, notwithstanding the fact that the legal and political process produced a victory for Bush.

Florida in 2000 is mostly not a story of fraud but instead one of defective election administration. Across the state, tabulators simply failed to record all of the intended votes. The intentions of more than 50,000 voters who went to the polls on election day to cast a vote for either Bush or Gore were frustrated, as their effort to produce a ballot that would be counted as valid instead produced a ballot that was discarded as spoiled. Some of the spoiled ballots were undervotes, where the tabulation failed to discern that the voter had marked any choice on the ballot. In places in Florida that used punch card voting machines, undervotes were famously associated with "dimpled chads" and other manifestations of incompletely punched ballots (Greenhouse 2000). Other spoiled ballots were overvotes, where multiple marks on the ballot made the voter's choice ambiguous. Some officials, such as Orange County's Elections Supervisor Bill Cowles, argued that the blame for spoiled ballots ultimately rests with the voters, asking "Where does their stupidity enter into the picture?" (Roy and Griffin 2001).

Across the localities of Florida, the rate and pattern of ballot spoilage in the 2000 election varies systematically with the type of tabulation method used. It is doubtful that

voters' stupidity varied systematically with whether, say, poll workers at the voter's precinct advised the voter of any errors on the ballot and gave the voter a chance to correct them. Providing such warnings demonstrably reduced the rate at which overvoted ballots were produced. But it is unquestionable—true by definition—that the quality of the election administration in each locality is linked to the presence of such procedures.

I begin by reviewing some of the evidence that shows that, taking into account the discarded intended votes, the 2000 election in Florida produced the wrong outcome. I begin with a review of the studies, mostly published in newspapers and focused on the overvotes, that have previously suggested such a conclusion. Then I offer my own analysis of available ballot-level data, using a simple model designed to estimate the number of intended major-party votes included among the overvotes. Not all of the overvotes represent bona fide intentions to vote for either Bush or Gore. Some reflect intentions to vote for some other candidate or to spoil the ballot intentionally, and some are simply haphazard punches or scribbles. The model I propose estimates the proportion of the overvotes that were intended to be a vote for either Bush or Gore, based on the vote indicated on each ballot for the U.S. Senate race and on how the overvoted ballots compare to the ballots that have a single choice marked for president.

My discussion emphasizes differences among the various vote tabulation procedures used in Florida in 2000. All but one of Florida's 67 counties used one of four tabulation methods (Division of Elections 1999; Governor's Select Task Force 2001, 43–44).[1] There were two different kinds of punch card machines, Votomatic machines and Datavote machines, and there were two different modes of handling optically scanned ballots. In some counties the rule was to scan and count the ballots in each precinct, while in others the ballots from all precincts were scanned at a central location. Most of the centrally tabulated ballots also used a potentially confusing format in which the list of presidential candidate names spilled over into a second column (St. Petersburg Times 2001a). In most cases, the precinct-tabulated systems went with technology that would warn a voter when the ballot

[1]Union County used paper ballots tabulated by hand.

the voter cast had more marks for an office than were allowed for that office, and the voter would be given a chance to submit a corrected ballot. The centrally tabulated systems did not include such a warn-and-correct feature. As I shall discuss, in some cases precinct tabulation was used but the warning feature was not operational. Studies of voting systems that have examined the residual vote in counties across the country have found that optical systems are generally superior to punch card systems (Brady, Buchler, Jarvis, and McNulty 2001; Caltech/MIT Voting Technology Project 2001; U.S. General Accounting Office 2001).

In response to the 2000 election debacle, election administration was reformed throughout Florida (MacManus 2003). The reforms include replacing punch card and centrally scanned systems. An analysis of the experience in Florida in the 2002 elections concluded, "Replacement of central count optical scan and punch card voting systems with precinct count optical scan and touch screen systems dramatically reduced the level of overvotes and undervotes" (Division of Elections 2003, 1). There is impetus to reform electoral procedures across most of the United States, efforts motivated in part by the Help America Vote Act of 2002 (HAVA, Public Law 107-252; Montjoy 2003). I conclude with a discussion of the kind of information that will be needed to evaluate how well HAVA and other reform efforts are doing in moving American elections toward the goal of ensuring that every intended vote is counted.

Florida 2000 Overvotes Reviewed

The effect that better election procedures in Florida might have had on Bush's official margin of victory over Gore, which was 537 votes, has been extensively examined. Wand, Shotts, Sekhon, Mebane, Herron, and Brady (2001) demonstrate that the butterfly ballot used in Palm Beach County caused more than 2,000 voters to vote by mistake for Pat Buchanan instead of Gore, and Herron and Sekhon (2003) show that overvotes in two Florida counties tended to come from Democrats and consequently diminished Gore's vote total. It is well established that throughout Florida blacks and Democrats tended to be disproportionately affected by voting problems (Mintz and Keating 2000; U.S. Commission

on Civil Rights 2001; Fessenden 2001).

Newspaper organizations have conducted the most thorough examinations of balloting in the 2000 election in Florida. The standard mode of operation in these examinations has been to reinspect ballots that were not counted as part of the certified vote total (Damron, Campbell, and Roy 2000; Roy and Damron 2001b; Driscoll 2001; Henderson 2001; Merzer 2001a,b). The most intensive reexamination of the uncounted ballots was conducted by the National Opinion Research Center (NORC), acting under contract to a consortium of news organizations (National Opinion Research Center 2001b).

In light of the lawsuits and court-ordered recount efforts that took place in the weeks following the election (Kaplan 2001; Toobin 2001), these studies highlighted what the outcome would have been had different standards been used during the court-ordered recount to evaluate incomplete punches on punch card ballots. These exercises mainly focused on the undervotes. Depending on the standards used to evaluate whether a mark on a ballot should count as a vote, and on the subset of Florida counties taken into account, a range of outcomes could be produced, ranging from a narrow Bush victory to a narrow Gore victory (Keating and Balz 2001; National Opinion Research Center 2001a).

The assumption prevailing in most of the what-if scenarios was that overvotes would have been ignored in any legal recount process. The U.S. Supreme Court's decision to stop the recount because, according to the *Per Curiam* opinion, the recount had fatal equal protection problems, was based in part on seven Justices' anticipation that the manual recount mandated by the Florida Supreme Court would ignore overvotes on which "a manual examination of the ballot would reveal the requisite indicia of intent" (*Bush v. Gore*, 531 U.S. 108 (2000)). But remarks by the Florida state judge who was presiding over the recount effort suggest that that assumption may have been inappropriate. In an interview conducted early in 2001, Leon County Circuit Court Judge Terry Lewis suggested that "he would not have ignored the overvote ballots" (Damron and Roy 2001). An effort to simulate what would have happened if overvoted ballots on which the voter's intent could be determined unambiguously had been counted throughout Florida concluded

that the result could have been a narrow Gore victory (Damron and Roy 2001).

The overvoted ballots on which the voter's intent could be clearly determined were principally ballots cast using optical scan equipment. On such ballots frequently the voter filled in the oval for a candidate but then also wrote in the same candidate's name. The tabulation equipment would have routinely rejected such ballots. Another common error on optical ballots was that a voter would vote for two candidates and then cross one out or write a note requesting that the extra vote be ignored (Damron and Roy 2001). Florida law specified that a vote should be counted whenever the voter's intent can be determined.

In counties where the Votomatic punch card voting machines were used, it was not possible to recover similar information a voter may have written, because none of the reinspection efforts examined the envelopes or ballot stubs used for write-in votes with such machines. For the NORC study, inspectors examined only duplicate ballots that may have been created to transcribe the write-in information. Any such ballot where a voter wrote in a name to try to correct an error would appear in the NORC data to be a ballot on which multiple candidates were selected (Jergovic 2003).

In all the counties of Florida, whatever type of voting equipment was used, the number of overvotes for which a voter's intent could not be clearly determined in the reinspection processes greatly exceeds the number for which a clear determination may have been possible. Table 1 offers one perspective on this fact. The top of the table reproduces the certified vote totals that were the official final results. The bottom of the table uses the NORC data to separate into four categories all the overvotes on election day ballots for which any sign of a preference between Bush and Gore could be determined. In all cases ballots that have marks for both Bush and Gore, or for neither, are excluded. Unambiguous write-ins are ballots on which there is a mark for either Bush or Gore, that candidate's name is also written in, and no other marks are on the ballot. Ambiguous write-ins are ballots on which there is a mark for either Bush or Gore, that candidate's name is also written in, and other marks are on the ballot. Two-mark overvotes are ballots on which either Bush or Gore is marked and also one other mark is on the ballot.

Multiple-mark overvotes are ballots on which either Bush or Gore is marked and also more than one other mark is on the ballot.

*** Table 1 about here ***

Counting all of the overvotes that could be allocated to either Bush or Gore as if they were bona fide votes certainly changes the outcome. Gore gains more than a 45,000 vote margin over Bush. Gore wins in this sense even if only a subset of the allocated overvotes are counted. The write-ins counted as unambiguous in Table 1 are not enough to overcome Bush's certified margin of 537 votes, but the total of all the write-ins, which nets Gore 847 votes, is sufficient. Note that some of the write-ins that are deemed ambiguous in this accounting might not be ambiguous according to the standards of some of the other ballot reinspections, such as that reported by Damron and Roy (2001). For instance, an error on an optical ballot that a voter tried to correct by both marking and writing in the preferred candidate's name would be counted as an ambiguous write-in in Table 1.

Summarizing the allocated write-in ballots for counties that used optical scan equipment shows that a higher proportion of Gore's votes than Bush's were lost to uncounted write-ins and that more uncounted write-ins occurred with central tabulation than with precinct tabulation.[2] These patterns are apparent in Table 2, which shows the raw number of unambiguous and ambiguous allocated write-ins and the ratio of the number of write-ins allocated to each candidate to the number of votes officially certified for that candidate.[3]

*** Table 2 about here ***

Lake County, which has the highest absolute number of allocated write-ins (208 for Bush and 435 for Gore) and relatively high ratio values (0.0042 for Bush and 0.0119 for

[2]With the NORC data it is also possible to allocate write-in overvotes for counties that used Datavote punch card voting machines. Such overvotes are rare. The nine Datavote counties together have a total of nine unambiguous and 20 ambiguous write-in ballots. Madison County has 15 of the allocated write-ins and Gilchrist County has seven of them.

[3]The particular brand and model of the optical scan machine does not appear to affect the pattern of allocated write-ins.

Gore), was the object of media attention because the county's election canvassing board voted not to count ballots on which the same candidate's name was both marked and written in (Damron et al. 2000; Damron and Shaw 2001). Other counties where canvassing boards decided not to count such ballots, such as precinct-tabulated Okaloosa (Arzua 2001), have substantially lower ratios, however (e.g., 0.0006 for Bush and 0.0012 for Gore in Okaloosa). Unfortunate positioning of the write-in option on the Lake County ballot, an effect of that county's decision to print all of the presidential election choices in a single column, may have contributed to the write-in problems there (Wersinger 2001).

As emphasized in previous reports based on the NORC data (e.g. Bousquet and Tobin 2001), most of the allocated overvotes have no indication that they are any kind of write-in, rather they are ballots with two marks or more than two marks on them. Table 3 shows how the two-mark and multiple-mark allocated overvotes are distributed across the counties of Florida. The tables show the raw numbers of such ballots in the NORC data and the ratios of the number of allocated overvotes to the certified vote counts, broken down by type of voting machine, tabulation protocol and ballot format.

*** Table 3 about here ***

The frequency of the allocated overvotes with two or more marks varies significantly with the type of election administration, especially with the type of ballot, voting machine and tabulation protocol that was used. The counties with the highest numbers of allocated overvotes of this type are Palm Beach, Duval and Miami-Dade. In terms of ratios to the certified vote counts, Duval County has the worst results among all the counties for Gore although not for Bush. This result almost certainly is due to the two-page ballot used in Duval County, which has been widely documented to have caused voting errors especially in areas predominantly populated by blacks (St. Petersburg Times 2001b; Bonner and Barbanel 2000; Mintz and Keating 2000). In terms of ratios, Palm Beach and Miami-Dade counties do not appear to be especially bad, notwithstanding Palm Beach County's disastrous butterfly ballot (Nichols 2001; Wand et al. 2001). Most of the counties that used Datavote machines have results that are at least as bad. Datavote counties in which the

presidential candidates' names spanned two pages have higher frequencies of ballots with two marks than do Datavote counties in which the candidates' names all appear on one page. The ratios for counties that used centrally tabulated optical scan machines and ballots on which the presidential candidates' names were printed in two columns are even worse (compare Agresti and Presnell 2002).

The ratios are typically much smaller in counties that used precinct-tabulated optical scan machines. The exceptions are Columbia and Escambia counties, which have ratio results as bad as the one county (Lake) that used centrally tabulated optical machines and ballots with the presidential candidates' names all printed in one column.[4] For Escambia County this result is not surprising, because officials in that county disabled the machine option that would have informed each voter that extra marks were on the ballot and given the voter a chance to submit a corrected ballot (Roy and Damron 2001a). In Columbia County the ballot-correction feature seems also not to have been functioning in many precincts (e.g. Roy and Damron 2001a), even though years after the fact county election officials continue to believe that the feature was activated throughout the county (Singletary 2003). The ballot-correction feature was also disabled in Manatee County (Damron and Roy 2001), where the ratios are lower than in Columbia or Escambia counties but are substantially above the median ratios for precinct-tabulated counties.

[4]Interestingly, Lake is the only county that used centrally tabulated optical scan equipment for which the ratio of the Gore ratio to the Bush ratio is greater for the two-mark allocated overvotes than it is for the multiple-mark allocated overvotes. This result supports reports that the small print on the ballot especially confused some voters who could not distinguish "Lieberman" from "Libertarian" and hence marked their ballots for both Gore and Libertarian Harry Browne (Damron and Shaw 2001).

Are Many Marks a Vote?

Which of these prima facie ambiguous ballots actually represent votes that were intended for one of the major party candidates? There is no way to determine this with certainty for any individual ballot. It is possible, however, to get a useful estimate of the proportion of the two-mark and multiple-mark ballots that can be interpreted as conveying a specific vote intention.

Previous discussions of the two-mark overvotes have used plausible criteria to assess them. An analysis of ballot image computer files from several counties that used Votomatic voting machines cited the most important pattern, which refers to the votes cast in the race for the U.S. Senate seat, where Democrat Bill Nelson opposed Republican Bill McCollum. Ballots that have both an overvote in which one punch was for Gore and also a valid Senate vote were much more likely to vote for Nelson than for McCollum (Keating 2001). Other reports, either focusing on Palm Beach County (Engelhardt and McCabe 2001) or all of Florida (Bridges 2001), also used the Senate voting pattern as evidence that some of the overvotes represented clear voter intentions. Such evidence has led several analysts to conclude that ballots with two marks cost Gore enough votes to lose the election (e.g. Keating 2001; Engelhardt and McCabe 2001; Bousquet and Tobin 2001; Kunerth 2001).

Examining the Senate voting pattern on overvoted ballots is a good behavioral approach to the problem of discerning voters' intentions, but the application of this approach can be sharpened. The reports that have used this approach fail to provide a baseline we might use to evaluate the numbers. A report such as Bridges (2001) compares two percentages: the percentage of voters who chose Gore and another candidate and also voted for Nelson, and the percentage of voters who chose Bush and another candidate and also voted for McCollum. Bridges uses ballot image data from eight Votomatic counties. The difference Bridges reports between the Gore-Nelson percentage and the Bush-McCollum percentage, respectively 75 percent and 45 percent, may seem to suggest that a fair number of the Gore overvotes represent frustrated voter intentions while most of the Bush overvotes are meaningless. But no clear standard is presented against which to compare these numbers.

A plausible and simple standard of comparison is readily available, however. We should compare the pattern in the overvotes to the pattern among the ballots that counted in the certified vote totals.

How does the pattern of Senate voting on ballots that have two-mark and multiple-mark allocated overvotes for president compare to the pattern on ballots that have only one mark on the ballot for president? Using the same kind of ballot image data that were used by Keating (2001), for ten Votomatic counties we can answer this question for one version of the behavioral measure.[5] For each county I compute four proportions: the proportion of the ballots that have a vote, or an allocated vote, for Bush and also have a single mark in the Senate race for either McCollum or Nelson; the proportion of the ballots that have a vote or allocated vote for Gore and such a single mark in the Senate race; the proportion of the preceding ballots for Bush that have a vote for McCollum; and the proportion of the preceding ballots for Gore that have a vote for Nelson. I compute the proportions separately for ballots that have only one mark for the presidential candidates, have two marks and have more than two marks. Presumably the one-mark ballots were counted as valid votes for president. I use only data for election-day ballots.

In every county, the proportions are smaller when there is more than one mark on the ballot for president than when there is only one mark. The pattern of decreases in the proportion of ballots that have a valid vote for a major party Senate candidate, as the number of marks increases, does not mean that two-mark and multiple-mark voters are that much more likely to vote for a third-party candidate. Rather the pattern mostly reflects a phenomenon Herron and Sekhon (2003) documented using ballot image data for Broward and Miami-Dade counties, which is that voters who overvote for president tend also to have overvotes for other offices. I interpret this pattern as indicating that some of the ballots that have more than one mark convey an intention to vote for one of the major party candidates, as the singly marked ballots do, but some of the ballots that have more

[5]The ballot image data files are available, with documentation, from the National Election Studies website `http://www.umich.edu/~nes/florida2000/data/ballotimage.htm`.

than one mark are meaningless.

The simplest version of the idea underlying this interpretation begins with the thought that there are two kinds of voters. Call them true voters and random voters. Assume that all voters who mark only one candidate for president are true voters, but only a fraction of the voters who make multiple marks for president are true voters. True voters always vote so as to convey a specific voting intention, even though they sometimes make mistakes. Random voters simply make marks at random. The conditional Senate voting behavior of the one-mark voters, given their presidential choices, is the standard for the behavior of the true voters in each county. Any discrepancy between that standard and the conditional Senate voting behavior of the two-mark or multiple-mark voters is due to the presence of random voters in those groups. The Appendix explicates this idea in more precise mathematical terms.

Using ballot image data to compute the proportion of true votes, denoted β, produces the results shown in Table 4. The computed β ranges from a high value of 0.89 for the two-mark allocated Gore overvotes in Palm Beach County to a low of 0.03 for the multiple-mark allocated Bush overvotes in Marion County. In every case but one, β is greater for the allocated Gore overvotes than for the allocated Bush overvotes of the same type in the same county. In all but two cases β is greater for the two-mark ballots than for the multiple-mark ballots allocated to the same candidate in a county. By and large the results are reasonably well summarized by saying that a higher proportion of the overvotes allocated to Gore rather than to Bush were true votes, and many more of the two-mark overvotes than of the multiple-mark overvotes were true votes.

*** Table 4 about here ***

The bottom part of Table 4 shows the results of multiplying the number of allocated overvotes of each type by the corresponding β value, in order to estimate the number of true votes that were not counted because they were recorded as overvotes. The counties that have high raw numbers of allocated overvotes also tend to have high values for the proportion of them that are true votes. The result is a net gain from these ten counties of

more than 22,000 votes for Gore over Bush.

To use the NORC data to apply this method to the other counties of Florida requires some imputation, because information is lacking about the distribution of Senate voting behavior given a valid (i.e., one-mark) vote for either Bush or Gore. A reasonable approach is to use values taken from the counties where ballot image data are available.[6] For each of the four types of proportions for the one-mark ballots it is reasonable to use the median among the counties as the estimate of the two key quantities when computing the proportion of true votes in the NORC data.[7]

To calculate the number of true votes, I aggregate the NORC data into categories based on the type of tabulation used in each county. Aggregating avoids statistical issues associated with the small numbers that occur in the smaller counties. The principal point of the analysis does not change when the data are handled slightly differently.

Table 5 reports the estimates of the true votes among the overvotes in the NORC data. The set of counties that use Votomatic voting machines excludes Duval County, for which the proportions are reported separately. Columbia and Escambia counties are again treated separately from the other counties where precinct-tabulated optical scan systems were used. As in the results based on the ballot image data, the proportion of true votes is higher among the ballots allocated to Gore than among the ballots allocated to Bush, and

[6]The proportion of one-mark ballots that have a valid vote for a major party Senate candidate does not vary much among the counties. The values range between 0.95 and 0.96 for Bush and between 0.93 and 0.95 for Gore. The exceptional county for both Bush and Gore is Miami-Dade, where for both candidates the proportion is 0.89. The results in that county reflect that an unusually high proportion of the one-mark ballots lack any valid vote for the Senate. The elevated rate of Senate nonvoting is evident in most of the precincts in the county. There is somewhat greater variation among the proportions of one-mark ballots on which the Senate vote is for the candidate of the same party as the chosen presidential candidate.

[7]That is, I use the medians for the values P_1 and S_1 in equation (3) in the Appendix.

it is also higher among the two-mark ballots than among the multiple-mark ballots. The proportion of true votes is higher in Duval County than it is in the other Votomatic counties. The proportion of true votes for Bush is higher in Datavote counties that had candidates names on two pages than in Datavote counties that had the names all on one page. For Gore the reverse pattern occurs. In contrast, the proportion of true votes for Bush is much higher in the centrally tabulated optical scan county that had the candidates in a single column than it is in the counties that listed the candidates in two columns.

*** Table 5 about here ***

In every category the number of allocated overvotes estimated to be true votes for Gore is larger than the number estimated to be true votes for Bush. About 69 percent of all two-mark allocated overvotes and about 52 percent of the multiple-mark allocated overvotes are estimated to be true votes for either Bush or Gore. About 45 percent of the two-mark and multiple-mark overvotes allocated to Bush are estimated to be true votes, while about 68 percent of such overvotes allocated to Gore are estimated to be true votes. The overall net gain of 35,526 votes for Gore is more than enough to overcome Bush's certified margin of victory.

Dispositions versus Intentions

Do true votes as estimated in Tables 4 and 5 in fact represent genuine intentions to vote for either Bush or Gore? The conditional Senate voting behavior to which the model refers is a good although certainly imperfect measure of the disposition a voter has to act a certain way on the rest of the ballot, given the way the voter behaved when voting for president. In making the conditional behavior of one-mark voters the standard to which the behavior of two-mark and multiple-mark voters is to be compared, we are asking whether voters in the latter two groups on average have the same dispositions as voters who cast valid presidential votes. The model used to produce Tables 4 and 5 represents an effort to estimate the sizes of the subsets of two-mark and multiple-mark voters who have on average the same dispositions as the one-mark voters.

A skeptic might concede that the model is useful for estimating the sizes of those subsets but say that the model still falls short of the goal to identify the number of votes that were intended to go to either Bush or Gore. To have the same disposition to vote in a certain way for other offices, the skeptic might say, is not the same as having a specific intention to vote in a particular way for this one. The skeptic might point to studies such as Herron and Sekhon (forthcoming) or Tomz and Van Houweling (2003). Herron and Sekhon present examples in which some voters seem to have intentionally failed to cast valid votes for some offices but not others, in response to the race of the candidates and the competitiveness of the election. Citing such work the skeptic might argue as follows: We might use the office for which the most voters cast a valid vote as a basis for matching their dispositions and imputing votes for the other offices, but the fact remains that some of the voters to whom we have imputed valid votes specifically intended not to cast such a vote.

There is a point beyond which no conceivable data can refute such a counterargument, but I think a case can be made for concluding that most of the estimated true votes reported in Tables 4 and 5 reflect frustrated intentions to cast a valid vote and not willful efforts to cast a spoiled ballot. The point is to observe that while the dispositional mechanism the model captures is broadly similar across the various counties, the absolute frequency with which allocated overvotes occur varies tremendously across counties.

Consider Palm Beach and Pinellas counties. In Table 4 there are some differences between the counties in the proportions of the allocated overvotes that are true votes, but the numbers are not all that different. In contrast, ratio results such as are reported in Table 3 show that allocated overvotes occur in Palm Beach County at a rate roughly five times the rate they occur in Pinellas County. Undoubtedly the butterfly ballot used in Palm Beach caused many more voters to make mistakes there, but it is hard to believe that the ballot caused more voters to spoil their ballots intentionally.

Perhaps the results for counties that use precinct-tabulated optical scan machines should be viewed as the hardest test for the claim to be measuring intentions and not merely dispositions. After all, the stylized story about those counties is that every voter

who attempted to cast a ballot containing overvotes was confronted with a warning and given a chance to submit another ballot. In fact the implementation of this ideal warn-and-correct scenario was less than perfect. Columbia County is hardly the only county for which defective procedures have been documented (for examples from Bay and Orange counties see Roy and Griffin 2001). Without knowing for sure that the overvotes from the precinct-tabulated optical scan counties that seem to be true votes originate with voters who received a warning and yet did not correct the ballot, the results for these counties cannot be the basis of a compelling objection to the conclusion that the model is recovering mostly bona fide intended votes.

Election Reform

The official outcome of the 2000 presidential election in Florida was a complete disaster. Just taking into account the allocated overvotes that reflect genuine intentions to vote for either Bush or Gore, more than 57,000 voters who went to the polls on election day had their voting intentions frustrated. If none of the administrative defects that caused those intended votes not to be counted had existed, Gore would have won the state by more than 35,000 votes instead of losing by 537 votes. Taking these frustrated votes into account, the election was close, but not all that close—not exactly "poised on a knife edge," as some have written (Apple 2000). The administrative problems turned a clear Gore victory into a narrow loss.

The administrative problems in Florida in 2000 go beyond the much maligned butterfly ballot in Palm Beach County. Voters' intentions were frustrated throughout the state. Having the butterfly ballot certainly caused more overvotes to occur. But in proportional terms it was just as bad for a county to use a Datavote punch card voting machine with the candidates' names printed on two pages, and worse still to use a centrally tabulated optical scan system with the candidates names printed in two columns.

Election administration reform in Florida since the 2000 election has taken such facts into account, and now all Florida counties are mandated to use precinct-tabulated

equipment (MacManus 2003). We might ask, what would have happened in the 2000 election if that reform had been in effect at that time? It is a fraught enterprise to consider such a counterfactual, but the most straightforward, ballpark answer is to refer to Table 3 and imagine that the frequency of allocated overvotes throughout the state is reduced to the level typically occurring in precinct-tabulated optical scan counties. Among the latter set of counties (excluding Columbia and Escambia), the median ratio of overvotes to certified vote counts is 0.001. Using the ballpark method, the frequency of allocated overvotes in Votomatic counties—except Duval and Palm Beach—would typically have fallen by a factor of about five. In Duval and Palm Beach, assuming better designed ballots were also used there, the reduction would have been by a factor on the order of 50. In counties that used Datavote machines or centrally tabulated optical scan equipment, the reductions would have been by factors in the range of 10 to 60. The bottom line is that at least 90 percent of the allocated overvotes that were true votes would have been cast as valid votes. In that case, evidently, Gore wins by something like 30,000 votes.

HAVA provides financial support for states to improve their election administration systems (Election Reform Information Project 2002). Regarding vote tabulation, HAVA provides financial incentives for states to eliminate punch card voting machines, but it does not require that they do so (Montjoy 2003, 6). HAVA does require that any voting system used in federal elections after January 1, 2006, must permit each voter to verify and correct the ballot (Montjoy 2003, 7). This provision may appear to capture the important lesson from Florida, 2000, that the location of final ballot tabulation is not as important as giving the voter a specific warning and an opportunity to make corrections. The experience in Escambia, Columbia and precincts in other Florida counties that used precinct tabulation but did not follow the warn-and-correct protocol supports such a policy choice. But HAVA allows states not to use a specific warn-and-correct system. Punch card and central tabulation systems are allowed instead to substitute educational programs that tell voters about the effects of overvoting and tell them how to obtain a replacement ballot (HAVA, Title III, Sec. 301(a)(1)).

Across the country, optical-scan ballots are counted in a variety of ways. Processes vary across states and, as was the case in Florida in 2000, within states. Information at electionline.org (Election Reform Information Project 2003a), supplemented by a canvass of Secretary of States' offices and web sites, shows in early June 2003 that of the states that indicated they used optical-scan equipment, six exclusively counted at a central location in the counties, ten counted at the precinct level, and twelve did both. The remaining states either did not use optical-scan equipment, did not detail their counting technique, or left it up to the individual counties to decide in each election. As of early September 2003, 16 states (including Washington, D.C.) either exclusively used warn-and-correct systems or had active plans to change exclusively to such systems, 18 states lacked a clear plan for the systems to be adopted under HAVA, and 17 states definitely did not plan to adopt a warn-and-correct system (National Conference of State Legislatures 2003; Election Reform Information Project 2003b). Most of the latter 17 states used paper ballots, which are generally found to have a low rate of errors (Caltech/MIT Voting Technology Project 2001). Note, however, that in Table 3 the error rate for Union County, which used paper ballots, is as high as the rate in the optically scanned county that listed the candidates in a single column.

HAVA calls for all states to obtain voting equipment that complies with federal standards, but those standards refer to the technical operating characteristics of the machines and "are not intended to define appropriate election administration practices" (Federal Election Commission 2002, 2-1). A few of the problems with the vote in Florida in 2000 may trace to mechanical problems, but mostly they have to do with human behavior in response to the environment at polling places, including but not limited to the machines. Not only voter behavior but also how poll workers act on election day is important.

Behavioral measures such as I have analyzed in this paper are a necessary part of any effort to evaluate whether HAVA and other initiatives are bringing election administration throughout the country up to an acceptable level. Studies such as Brady et al. (2001), Caltech/MIT Voting Technology Project (2001), Knack and Kropf (2003), Tomz and Van

Houweling (2003) and U.S. General Accounting Office (2001) have used the residual vote as a behavioral standard. This is primarily a matter of feasibility. For most recent elections in the United States, the only available data consists of counts of votes aggregated to the level of counties or at best precincts. With such data, the total number of votes that were deemed invalid in each locality is usually all there is to work with.

The analytical approach I have used, which is based on trying to diagnose the voting dispositions of individual voters, depends on having information about votes cast for different offices at the level of individual ballots. It is only by the most fortunate of largely accidental circumstances that some of the early investigators of the Florida 2000 election managed to obtain ballot-level information from a subset of Florida's counties. No policy mandated that such data be routinely preserved and made available.

No such policy exists currently, either in Florida or elsewhere, but nonetheless it is vitally important that efforts be undertaken to collect such information in a systematic manner. The fact that the residual vote is reduced is not enough to guarantee that meaningful votes are not being lost. The median ratio of allocated overvotes to certified votes was only 0.001 in Florida counties that used precinct-tabulated optical scan systems, but the results in Table 5 suggest nonetheless that many of those overvotes represent frustrated true votes. To refer to the familiar automated banking machine norm, would anyone accept a banking machine that threw away one cent out of every ten dollars a customer requested?

In today's large, polarized and closely divided electorates, even an error rate of one in a thousand intended votes lost may be too high. Among the goals of election reform should be the standard that no meaningful vote goes uncounted. Ballot-level data are needed to monitor how closely that standard is being approached. To let an election again be awarded to one candidate when another was the voters' intended choice would be beyond outrageous.

Appendix

To describe precisely the procedure used to estimate the proportion of true votes among the allocated overvotes, let P_1 denote the observed proportion of one-mark voters who cast a Senate vote for one of the major party candidates, and let P_2 denote the observed proportion of two-mark voters who do so. Assume that P_1 is the rate at which all true voters vote for a major party candidate. The rate at which random voters do so is an unknown quantity denoted H. P_2 is an average of the rates P_1 and H, weighted by the unknown proportion of true voters among the two-mark voters. Let β denote that proportion. Then

$$P_2 = \beta P_1 + (1 - \beta)H \ . \tag{1}$$

For the additional information needed to find β, let S_1 denote the observed proportion of one-mark Bush voters who vote for McCollum instead of Nelson, and let S_2 denote the observed proportion of two-mark Bush voters who do so. Assume that S_1 is the rate at which all true Bush voters choose McCollum over Nelson. The rate at which random voters who happen to have voted for either McCollum or Nelson end up voting for McCollum is an unknown quantity denoted R. S_2 is an average of the rates S_1 and R, weighted by the unknown proportion of true voters among the two-mark Bush voters who also voted for either McCollum or Nelson. Using α to denote that proportion,

$$S_2 = \alpha S_1 + (1 - \alpha)R \ . \tag{2}$$

Equation (1) implies $\alpha = \beta P_1 / P_2$, so, substituting for α, equation (2) can be solved for β:

$$\beta = \frac{P_2(S_2 - R)}{P_1(S_1 - R)} \ . \tag{3}$$

If we assume that the random voters who happen to have picked Bush are truly choosing at random between McCollum and Nelson, then it is reasonable to set $R = 1/2$. The other four quantities needed to compute β from equation (3) are all observed, so the stated model gives a practical procedure for computing the proportion of true votes among

the two-mark overvotes allocated to Bush. It is straightforward to apply the procedure both to the overvotes allocated to Gore and to the allocated multiple-mark overvotes.

Inspecting the ballot-image data shows that there is a problem with this simple model because for Broward County $S_2 > S_1$ for Gore, and for Highlands and Hillsborough counties there is the analogous problem with the multiple-punch overvotes allocated to Gore. In terms of the model, this is possible only if $S_1 < R$. To cover these exceptional cases we would need $R \geq 0.95$ for the random voters who happened to have made marks for Gore. Such a high value for R would raise a question about how random the so-called random voters really are in these cases. The amount by which S_2 exceeds S_1 is small, however. Rather than complicate the model, I simply set $(S_2 - R)/(S_1 - R) = 1$ whenever $S_2 > S_1$.

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Table 1: Votes and Allocated Overvotes in Florida, 2000 Presidential Election

	Vote Counts	
	Bush	Gore
Certified Results:[a]		
Florida Total	2,911,215	2,911,417
Federal Absentee	1,575	836
Certified Total	2,912,790	2,912,253
Uncounted Election-day Ballots:[b]		
Unambiguous Write-ins	477	732
Ambiguous Write-ins	220	812
Two-mark Overvotes	15,236	39,148
Multiple-mark Overvotes	8,355	29,328
All Allocated Overvotes	24,288	70,020

Sources: [a] "November 7, 2000 General Election Official Results," Florida Department of State. [b] "Florida Ballots Project Data Files," NORC.

Table 2: Write-in Overvotes in Florida Counties with Optical Scan Machines, NORC Data

	Unambiguous		Ambiguous		Ratio: Write-in to Certified	
Tabulation	Bush	Gore	Bush	Gore	Bush	Gore
Central	251	419	162	567	0.0029	0.0087
Precinct	222	308	50	219	0.0003	0.0006

Table 3: Allocated Overvotes in Florida Counties, 2000 Presidential Election, NORC Data

	Number of Allocated Ballots			
	Two Marks		Multiple	
Tabulation	Bush	Gore	Bush	Gore
Votomatic—Duval	4,868	8,480	1,512	5,617
Votomatic—Miami-Dade	1,932	5,103	1,235	5,731
Votomatic—Palm Beach	2,258	10,687	811	3,882
Votomatic—Other	2,419	8,472	1,456	5,603
Datavote—One Page	248	407	377	1,053
Datavote—Two Pages	385	390	317	533
Optical Central—One Column	262	557	441	908
Optical Central—Two Columns	1,996	2,998	1,195	3,096
Optical Precinct	510	942	436	1,120
Opt. Prec.—Columbia, Escambia	339	1,093	528	1,723
Hand (Union)	19	18	47	62

	Ratio of Allocated Ballots to Certified Vote Counts			
	Two Marks		Multiple	
Tabulation	Bush	Gore	Bush	Gore
Votomatic—Duval	0.032	0.079	0.010	0.052
Votomatic—Miami-Dade	0.007	0.016	0.004	0.017
Votomatic—Palm Beach	0.015	0.040	0.005	0.014
Votomatic—Other	0.002	0.008	0.001	0.005
Datavote—One Page	0.011	0.023	0.017	0.060
Datavote—Two Pages	0.019	0.038	0.015	0.052
Optical Central—One Column	0.005	0.015	0.009	0.025
Optical Central—Two Columns	0.021	0.039	0.013	0.040
Optical Precinct	0.001	0.001	0.000	0.001
Opt. Prec.—Columbia, Escambia	0.004	0.023	0.006	0.036
Hand (Union)	0.008	0.013	0.020	0.044

Table 4: Estimated True Votes Among the Presidental Overvotes, Ballot Image Data

	Proportion True Votes			
	Two Marks		Multiple	
County	Bush	Gore	Bush	Gore
Broward	0.48	0.87	0.28	0.45
Highlands	0.53	0.63	0.47	0.68
Hillsborough	0.44	0.81	0.15	0.51
Lee	0.65	0.70	0.33	0.19
Marion	0.40	0.61	0.03	0.30
Miami-Dade	0.58	0.69	0.43	0.58
Palm Beach	0.63	0.89	0.33	0.57
Pasco	0.24	0.82	0.31	0.47
Pinellas	0.54	0.76	0.40	0.50
Sarasota	0.39	0.51	0.27	0.31

	Estimated True Votes Among the Overvotes					
	Two Marks		Multiple		Total	
County	Bush	Gore	Bush	Gore	Bush	Gore
Broward	211	2,676	84	945	295	3,620
Highlands	25	48	16	47	41	95
Hillsborough	146	913	33	492	179	1,404
Lee	144	387	29	32	173	420
Marion	57	161	1	50	59	211
Miami-Dade	1,112	3,536	512	3,319	1,623	6,855
Palm Beach	1,435	9,522	254	2,133	1,689	11,654
Pasco	59	602	55	182	114	784
Pinellas	260	1,224	98	497	357	1,720
Sarasota	63	117	16	41	79	159
Total	3,512	19,185	1,098	7,738	4,610	26,922

Table 5: Estimated True Votes Among the Presidental Overvotes, NORC Data

	Proportion True Votes			
	Two Marks		Multiple	
Tabulation	Bush	Gore	Bush	Gore
Votomatic	0.48	0.70	0.28	0.42
Votomatic—Duval	0.74	0.85	0.48	0.82
Datavote—One Page	0.32	0.82	0.06	0.74
Datavote—Two Pages	0.58	0.73	0.33	0.72
Optical Central—One Column	0.70	0.87	0.71	0.78
Optical Central—Two Columns	0.33	0.78	0.15	0.71
Optical Precinct	0.53	0.81	0.19	0.66
Opt. Prec.—Columbia, Escambia	0.42	0.86	0.36	0.81

	Estimated True Votes Among the Overvotes					
	Two Marks		Multiple		Total	
Tabulation	Bush	Gore	Bush	Gore	Bush	Gore
Votomatic	3,184	16,944	980	6,421	4,164	23,364
Votomatic—Duval	3,586	7,168	728	4,609	4,314	11,777
Datavote—One Page	71	284	20	603	91	887
Datavote—Two Pages	225	283	106	385	331	668
Optical Central—One Column	185	485	314	709	499	1,194
Optical Central—Two Columns	653	2,331	180	2,209	833	4,541
Optical Precinct	285	807	92	893	378	1,701
Opt. Prec.—Columbia, Escambia	141	936	188	1,397	329	2,333
Total	8,330	29,238	2,608	17,226	10,939	46,465