

STATUTES ON VOTE FRAUD AND VOTER INTIMIDATION – SOUTH DAKOTA

- 12-26-7. Impersonation of registered voter as felony. A person who impersonates a registered voter and, as such, offers to vote at any election, is guilty of a Class 5 felony.
- 12-26-8. Voting more than once at any election as felony. A person who votes more than once at any election or who offers to vote after having once voted, either in the same or in another election precinct in South Dakota or elsewhere, is guilty of a Class 6 felony.
- 12-26-9. Good faith defense to prosecution for illegal voting. Upon any prosecution for procuring, offering, or casting an illegal vote, the accused may give in evidence any facts tending to show that he honestly believed upon good reason that the vote complained of was a lawful one; and the jury may take such facts into consideration in determining whether the acts complained of were knowingly done or not.
- 12-26-12. Persecution, threats, or intimidation to influence vote as misdemeanor--Obstruction of voter on way to polls. A person who directly or indirectly, intentionally, by force or violence, or by unlawful arrest, or by any abduction, duress, damage, harm, or loss, or by any forcible or fraudulent contrivance, or by threats to do or employ any of them, or by threats of bringing civil suit or criminal prosecution, withdrawal of customs or dealing in business or trade, or enforcing payment of debts, or by any kind of injury or threat of injury inflicted or to be inflicted on any voter or person to influence any voter, and attempted, done, or threatened, or caused to be attempted, done, or threatened by any person in his own behalf or in behalf of any other person or question voted upon or to be voted upon at any election, for the purpose of preventing, causing, or intimidating a voter to vote or refrain from voting for or against any person or question, or who does or causes to be done any of such things because of a voter having voted or refrained from voting on any such matter, or who intentionally and without lawful authority obstructs, hinders, or delays a voter on his way to any poll where an election is to be held, is guilty of a Class 2 misdemeanor.
- 12-26-15. Bribery of voter as misdemeanor--Acts constituting bribery. It is a Class 2 misdemeanor for any person, directly or indirectly, by himself or through any other person:
- (1) To pay, lend, contribute, or offer or promise to pay, lend, or contribute, any money or other valuable consideration, to or for any voter or to or for any other person, to induce such voter to vote or refrain from voting at any election or to induce any voter to vote or refrain from voting at such election for any particular person or to induce such voter to go to the polls or remain away from the polls at such election, or on account of such voter having voted, refrained from voting or having voted or refrained from voting for any particular person, or having gone to the polls or remained away from the polls at such election;
  - (2) To give, offer, or promise any office, place, or employment, or to promise to procure or endeavor to procure any office, place, or employment to or for any voter, or to or for any other person in order to induce such voter to vote or refrain from voting at such election for any particular person;
  - (3) To make any gift, loan, or promise, offer, procurement, or agreement as aforesaid to, for, or with any person in order to induce such person to procure or endeavor to procure the election of any person, or the vote of any voter at any election;
  - (4) To procure or engage, promise, or endeavor to procure, in consequence of any such gift, loan, offer, promise, procurement, or agreement, the election of any person or the vote of any voter at such election;
  - (5) To advance or pay, or cause to be paid, any money or other valuable thing to or for the use of any other person, with the intent that the same or any part thereof shall be used in bribery at any election, or to knowingly pay or cause to be paid any money or other valuable thing to any person in discharge or repayment of any money wholly or in part expended in bribery at any election.
- 12-26-15. Bribery of voter as misdemeanor--Acts constituting bribery. It is a Class 2 misdemeanor for any person, directly or indirectly, by himself or through any other person:

(1) To pay, lend, contribute, or offer or promise to pay, lend, or contribute, any money or other valuable consideration, to or for any voter or to or for any other person, to induce such voter to vote or refrain from voting at any election or to induce any voter to vote or refrain from voting at such election for any particular person or to induce such voter to go to the polls or remain away from the polls at such election, or on account of such voter having voted, refrained from voting or having voted or refrained from voting for any particular person, or having gone to the polls or remained away from the polls at such election;

(2) To give, offer, or promise any office, place, or employment, or to promise to procure or endeavor to procure any office, place, or employment to or for any voter, or to or for any other person in order to induce such voter to vote or refrain from voting at such election for any particular person;

(3) To make any gift, loan, or promise, offer, procurement, or agreement as aforesaid to, for, or with any person in order to induce such person to procure or endeavor to procure the election of any person, or the vote of any voter at any election;

(4) To procure or engage, promise, or endeavor to procure, in consequence of any such gift, loan, offer, promise, procurement, or agreement, the election of any person or the vote of any voter at such election;

(5) To advance or pay, or cause to be paid, any money or other valuable thing to or for the use of any other person, with the intent that the same or any part thereof shall be used in bribery at any election, or to knowingly pay or cause to be paid any money or other valuable thing to any person in discharge or repayment of any money wholly or in part expended in bribery at any election.

12-26-16. Acceptance of bribe by voter as misdemeanor--Acts constituting acceptance of bribe. It is a Class 2 misdemeanor for any person, directly or indirectly, by himself or through any other person:

(1) To receive, agree, or contract for, before or during any election, any money, gift, loan, or other valuable consideration, offer, place, or employment for himself or any other person, for voting or agreeing to vote, or for going or agreeing to go to the polls, or for remaining away or agreeing to remain away from the polls at any such election;

(2) To receive any money or other valuable thing during or after an election, for himself or any other person for having voted or refrained from voting at such election, or on account of himself or any other person having voted or refrained from voting for any particular person at such election, or on account of himself or any other person having gone to the polls or remained away from the polls at such election, or on account of having induced any other person to vote or refrain from voting, for any particular person at such election.

STATUTES ON VOTE FRAUD AND VOTER INTIMIDATION – TENNESSEE

**2-19-107. Illegal registration or voting.**

A person commits a Class E felony who:

(1) Intentionally and knowing that such person is not entitled to, registers or votes in any manner or attempts to register or vote in any manner where or when such person is not entitled to under this title, including voting more than once in the same election; or

(2) Votes in the primary elections of more than one (1) political party on the same day.

**2-19-115. Violence and intimidation to prevent voting.**

It is a Class A misdemeanor for any person, directly or indirectly, personally or through any other person:

(1) By force or threats to prevent or endeavor to prevent any elector from voting at any primary or final election;

(2) To make use of any violence, force or restraint, or to inflict or threaten the infliction of any injury, damage, harm or loss; or

(3) In any manner to practice intimidation upon or against any person in order to induce or compel such person to vote or refrain from voting, to vote or refrain from voting for any particular person or measure, or on account of such person having voted or refrained from voting in any such election.

**2-19-117. Procuring illegal vote.**

It is a Class E felony for any person to procure, aid, assist, counsel or advise another to vote in any convention, primary or final election, knowing such person is disqualified.

**2-19-126. Bribing voters.**

It is unlawful for any person, directly or indirectly, personally or through any other person to:

(1) Pay, loan, contribute, or offer or promise to pay, loan or contribute any money, property, or other valuable thing, to or for any voter, or to or for any other person, to induce such voter or any voter to vote or refrain from voting in any political convention, primary or final election of any kind or character, or to induce such voter or voters to vote or refrain from voting at any such convention, primary or final election for or against any particular person or measure, or on account of any voter having voted for or against any particular person or measure, or having gone to or remained away from the polls at any such convention, primary or final election;

(2) Give, offer, or promise any place, office or employment, or promise or procure any place, office or employment, to or for any voter, or to or for any other person, in order to induce such voter to vote or refrain from voting at any convention, primary or final election, or to induce any voter at such convention or primary or final election to vote or refrain from voting for any particular person or measure;

(3) Advance or pay or cause to be paid any money or other valuable thing to or for the use of any voter, or to or for the use of any other person, with the intent that the same or any part thereof shall be used in bribery at any primary or final election, or otherwise unlawfully used at, concerning, or in connection with any such primary or final election; or knowingly pay or cause to be paid any money or other valuable thing in discharge or repayment of money or other valuable thing wholly or in part expended in bribery or other unlawful use at or in connection with any such primary or final election; or

(4) Advance, pay or cause to be paid, as expenses or otherwise, to or for the use of any person, any money or other valuable thing in order to induce such person or any person to work for, solicit or seek to influence votes for or against any particular person or measure, at or in connection with any convention, primary or final election; or induce such person or persons to procure, solicit or influence any voter to attend, leave, or remain away from any such convention, primary or final election; or pay or cause to be paid any money or other valuable thing to or for the use or benefit of any person in discharge or payment of or for time, labor, expenses, or services alleged to have been spent, performed, incurred, or rendered for or against any person, at or in connection with any such convention, primary or final election; provided, that this shall not include payment of expenses for soliciting attendance of any person upon party conventions, primaries, or final elections; and provided further, that nothing herein shall be construed to prohibit expenditures otherwise allowed by law.

**2-19-127. Voter accepting bribe.**

It is unlawful for any person, directly or indirectly, personally or through any other person, to:

(1) Receive, agree to receive, or contract for, before or during any primary or final election or convention provided by law, any money, gift, loan, or other valuable consideration, or any office, place or employment for such person or for any other person, for voting or agreeing to vote, or for going to or remaining or agreeing to remain away from the polls, or refraining or agreeing to refrain from voting for any particular person or measure, at or in connection with any such convention, primary or election; or

(2) Receive any money or other valuable thing during or after any convention, primary or final election provided by law, on account of such person or any other person, for voting or refraining from voting for any person or measure, or for going to the polls or remaining away from the polls at any such convention, primary or final election, or on account of having induced any person to vote or refrain from voting for any particular person or measure at any such convention, primary or final election.

STATUTES ON VOTE FRAUD AND VOTER INTIMIDATION - TEXAS

Election code § 13.007. FALSE STATEMENT ON APPLICATION.

- (a) A person commits an offense if the person knowingly makes a false statement or requests, commands, or attempts to induce another person to make a false statement on a registration application.
- (b) An offense under this section is a Class B misdemeanor.
- (c) For purposes of this code, an offense under this section is considered to be perjury, but may be prosecuted only under this section.

Election code § 64.012. ILLEGAL VOTING.

- (a) A person commits an offense if the person:
  - (1) votes or attempts to vote in an election in which the person knows the person is not eligible to vote;
  - (2) knowingly votes or attempts to vote more than once in an election;
  - (3) knowingly impersonates another person and votes or attempts to vote as the impersonated person; or
  - (4) knowingly marks or attempts to mark another person's ballot without the consent of that person.
- b) An offense under this section is a felony of the third degree unless the person is convicted of an attempt. In that case, the offense is a Class A misdemeanor.

Penal Code § 36.02. BRIBERY.

- (a) A person commits an offense if he intentionally or knowingly offers, confers, or agrees to confer on another, or solicits, accepts, or agrees to accept from another:
  - (1) any benefit as consideration for the recipient's decision, opinion, recommendation, vote, or other exercise of discretion as a public servant, party official, or voter;
  - (2) any benefit as consideration for the recipient's decision, vote, recommendation, or other exercise of official discretion in a judicial or administrative proceeding;
  - (3) any benefit as consideration for a violation of a duty imposed by law on a public servant or party official; or
  - (4) any benefit that is a political contribution as defined by Title 15, Election Code, or that is an expenditure made and reported in accordance with Chapter 305, Government Code, if the benefit was offered, conferred, solicited, accepted, or agreed to pursuant to an express agreement to take or withhold a specific exercise of official discretion if such exercise of official discretion would not have been taken or withheld but for the benefit; notwithstanding any rule of evidence or jury instruction allowing factual inferences in the absence of certain evidence, direct evidence of the express agreement shall be required in any prosecution under this subdivision.
- (b) It is no defense to prosecution under this section that a person whom the actor sought to influence was not qualified to act in the desired way whether because he had not yet assumed office or he lacked jurisdiction or for any other reason.
- (c) It is no defense to prosecution under this section that the benefit is not offered or conferred or that the benefit is not solicited or accepted until after:
  - (1) the decision, opinion, recommendation, vote, or other exercise of discretion has occurred; or
  - (2) the public servant ceases to be a public servant.
- (d) It is an exception to the application of Subdivisions (1), (2), and (3) of Subsection (a) that the benefit is a political contribution as defined by Title 15, Election Code, or an expenditure made and reported in accordance with Chapter 305, Government Code.
- (e) An offense under this section is a felony of the second degree.

Penal code § 36.03. COERCION OF PUBLIC SERVANT OR VOTER.

(a) A person commits an offense if by means of coercion he:

(1) influences or attempts to influence a public servant in a specific exercise of his official power or a specific performance of his official duty or influences or attempts to influence a public servant to violate the public servant's known legal duty; or

(2) influences or attempts to influence a voter not to vote or to vote in a particular manner.

(b) An offense under this section is a Class A misdemeanor unless the coercion is a threat to commit a felony, in which event it is a felony of the third degree.

(c) It is an exception to the application of Subsection

(a)(1) of this section that the person who influences or attempts to influence the public servant is a member of the governing body of a governmental entity, and that the action that influences or attempts to influence the public servant is an official action taken by the member of the governing body. For the purposes of this subsection, the term "official action" includes deliberations by the governing body of a governmental entity.

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STATUTES ON VOTE FRAUD AND VOTER INTIMIDATION – UTAH

**20A-1-601. Bribery in elections.**

- (1) It is unlawful for any person, directly or indirectly, by himself or through any other person to:
- (a) pay, loan, or contribute, or offer or promise to pay, loan, or contribute any money or other valuable consideration to or for any voter or to or for any other person:
    - (i) to induce the voter to vote or refrain from voting at any election provided by law;
    - (ii) to induce any voter to vote or refrain from voting at an election for any particular person or persons;
    - (iii) to induce a voter to go to the polls or remain away from the polls at any election;
    - (iv) because a voter voted or refrained from voting for any particular person, or went to the polls or remained away from the polls; or
    - (v) to obtain the political support or aid of any person at an election;
  - (b) give, offer, or promise any office, place, or employment, or to promise or procure, or endeavor to procure, any office, place, or employment, to or for any voter, or to or for any other person, in order to:
    - (i) induce a voter to vote or refrain from voting at any election;
    - (ii) induce any voter to vote or refrain from voting at an election for any particular person or persons; or
    - (iii) obtain the political support or aid of any person;
  - (c) advance or pay, or cause to be paid, any money or other valuable thing to, or for the use of, any other person with the intent that the money or other valuable thing be used in bribery at any election provided by law; or
  - (d) knowingly pay, or cause to be paid, any money or other valuable thing to any person in discharge or repayment of any money expended wholly or in part in bribery at any election.
- (2) In addition to the penalties established in Section 20A-1-609, any person convicted of any of the offenses established by this section shall be punished by a fine of not more than \$1,000, or by imprisonment in the state prison for not more than five years, or by both a fine and imprisonment.

**20A-1-602. Receiving bribe.**

- (1) It is unlawful for any person, for himself or for any other person, directly or indirectly, by himself or through any person, before, during or after an election to:
- (a) receive, agree to receive, or contract for any money, gift, loan, or other valuable consideration, office, place, or employment for voting or agreeing to vote, or for going or agreeing to go to the polls, or for remaining or agreeing to remain away from the polls, or for refraining or agreeing to refrain from voting, or for voting or agreeing to vote, or refraining or agreeing to refrain from voting for any particular person or measure at any election provided by law;
  - (b) receive any money or other valuable thing because the person induced any other person to vote or refrain from voting or to vote or refrain from voting for any particular person or measure at an election.
- (2) In addition to the penalties established in Section 20A-1-609, any person convicted of any of the offenses established by this section shall be punished by a fine of not more than \$1,000, or by imprisonment in the state prison for not more than five years, or by both a fine and imprisonment.

**20A-1-603. Fraud, interference, disturbance -- Tampering with ballots or records.**

- (1) It is unlawful for:
- (a) any person who is not entitled to vote to fraudulently vote; and
  - (b) any person to:
    - (i) vote more than once at any one election;
    - (ii) knowingly hand in two or more ballots folded together;
    - (iii) change any ballot after it has been deposited in the ballot box;
    - (iv) add or attempt to add any ballot to those legally polled at any election by fraudulently introducing the ballot into the ballot box either before or after the ballots have been counted;
    - (v) add to or mix, or attempt to add or mix, other ballots with the ballots lawfully polled while those ballots are being counted or canvassed, or at any other time;
    - (vi) willfully detain, mutilate, or destroy any election returns;
    - (vii) in any manner, interfere with the officers holding an election or conducting a canvass, or with the voters lawfully exercising their rights of voting at an election, so as to prevent the election or canvass from being fairly held or lawfully conducted;
    - (viii) engage in riotous conduct at any election or interfere in any manner with any election officer in the discharge of his duties;
    - (ix) induce any election officer, or officer whose duty it is to ascertain, announce, or declare the result of any election or to give or make any certificate, document, or evidence in relation to any election, to violate or

refuse to comply with his duty or any law regulating his duty;

(x) take, carry away, conceal, remove, or destroy any ballot, pollbook, or other thing from a polling place, or from the possession of the person authorized by law to have the custody of that thing; or  
(xi) aid, counsel, provide, procure, advise, or assist any person to do any of the acts specified in this section.

(2) In addition to the penalties established in Section 20A-1-609, any person convicted of any of the offenses established in this section shall be punished by a fine of not more than \$1,000, or by imprisonment in the state prison for not more than five years, or by both a fine and imprisonment.

**20A-2-401. Fraudulent registration -- Penalty.**

(1) It is unlawful for any person to willfully cause, procure, or allow himself to be registered to vote, knowing that he is not entitled to register to vote.

(2) It is unlawful for any person to willfully cause, procure, advise, encourage, or assist any other person to be registered to vote, knowing or believing that the person is not entitled to register to vote.

(3) Any person who violates this section is guilty of a class A misdemeanor.

**20A-3-502. Intimidation -- Undue influence.**

(1) (a) It is unlawful for any person, directly or indirectly, by himself or by any other person on his behalf, to make use of any force, violence, or restraint, or to inflict or threaten the infliction of, by himself or through any other person, any injury, damage, harm or loss, or in any manner to practice intimidation upon or against any person in order to induce or compel that person to:

(i) vote or refrain from voting for any particular person or measure at any election provided by law; or

(ii) vote or refrain from voting at any election.

(b) It is unlawful for any person by abduction or duress, or any forcible or fraudulent device or contrivance whatever, to impede, prevent, or otherwise interfere with the free exercise of the elective franchise of any voter, either in giving or refraining from giving his vote at any election, or in giving or refraining from giving his vote for any particular person at any election.

(c) It is unlawful for any employer, corporation, association, company, firm, or person to:

(i) enclose their employees' salary or wages in envelopes on which there is written or printed any political mottoes, devices, or arguments containing threats, express or implied, intended or calculated to influence the political opinion, views, or action of the employees; or

(ii) within 90 days of any election provided by law to put up, or otherwise exhibit, in its, their, or his factory, workshop, mine, mill, boarding house, office, or other establishment or place where employees may be working or be present in the course of employment, any handbill, notice, or placard containing any threat, notice, or information, that if any particular ticket or candidate is or is not elected:

(A) work in the establishment will cease in whole or in part;

(B) the establishment will be closed;

(C) wages of workmen be reduced; or

(D) other threats, express or implied, intended or calculated to influence the political opinions or actions of employees.

(2) Any person, whether acting in his individual capacity or as an officer or agent of any corporation, who violates any of the provisions of this section is guilty of a class B misdemeanor.

**20A-3-505. False impersonation -- Double voting.**

(1) (a) It is unlawful for any person to apply for a ballot in the name of some other person, whether it is that of a person living or dead, or of a fictitious person, or who, having voted once at a primary or election, applies at the same election for a ballot in his own name or any other name.

(b) Any person who violates this section is guilty of a felony and shall be punished by imprisonment in the state prison for not less than one nor more than three years.

(2) (a) It is unlawful for any person to aid, abet, counsel, or procure another person to commit the felony prohibited in Subsection (1).

(b) Any person who violates this subsection is guilty of a felony and shall be punished by imprisonment in the state prison for not less than one nor more than three years.

STATUTES ON VOTE FRAUD AND VOTER INTIMIDATION - VERMONT

**§ 1971. Casting more than one ballot.**

A legal voter who knowingly casts more than one ballot at any one time of balloting for the same office shall be fined not more than \$1,000.00, if the offense is committed at a general election, and not more than \$100.00, if committed in town meeting.

**§ 1973. Voting in more than one place.**

A person who, on the same day, votes in more than one town, district, or ward for the same office shall be fined not more than \$1,000.00.

**§ 2014. Unqualified person voting.**

A person, knowing that he is not a qualified voter, who votes at a town, village or school district meeting or a general election for an officer to be elected at such meeting or election shall be fined not more than \$100.00.

**§ 2015. Fraudulent voting.**

A person who personates another, living or dead and gives or offers to give a vote in the name of such other person or gives or offers to give a vote under a fictitious name at a town, village or school district meeting or a general election, for an officer to be elected at such meeting or election, shall be imprisoned not more than one year or fined not more than \$100.00, or both.

**§ 2016. Aiding unqualified voter to vote.**

A person who wilfully aids or abets a person who is not a duly qualified voter in voting or attempting to vote at a general election shall be fined not more than \$100.00.

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**§ 2017. Undue influence.**

A person who attempts by bribery, threats or any undue influence to dictate, control or alter the vote of a freeman about to be given at a general election shall be fined not more than \$200.00.

STATUTES ON VOTE FRAUD AND VOTER INTIMIDATION - VIRGINIA

§ 24.2-1004. Illegal voting and registrations.

A. Any person who (i) votes knowing that he is not qualified to vote where and when the vote is to be given, (ii) procures, assists, or induces another to vote, knowing that such person is not qualified to vote where and when the vote is to be given, or (iii) wrongfully deposits a ballot in the ballot container or casts a vote on any voting equipment, is guilty of a Class 1 misdemeanor.

B. Any person who intentionally (i) votes more than once in the same election, whether those votes are cast in Virginia or in Virginia and any other state or territory of the United States, or (ii) procures, assists, or induces another to vote more than once in the same election, whether those votes are cast in Virginia or in Virginia and any other state or territory of the United States, is guilty of a Class 6 felony.

C. Any person who intentionally (i) registers to vote at more than one residence address at the same time, whether such registrations are in Virginia or in Virginia and any other state or territory of the United States, or (ii) procures, assists, or induces another to register to vote at more than one address at the same time, whether such registrations are in Virginia or in Virginia and any other state or territory of the United States, is guilty of a Class 6 felony. This subsection shall not apply to any person who, when registering to vote, changing the address at which he is registered, transferring his registration, or assisting another in registering, changing his address, or transferring his registration, provides the information required by § 24.2-418 on the applicant's place of last previous registration to vote.

§ 24.2-1005. Bribery, intimidation, etc., of person receiving ballot.

Any person who (i) by threats, bribery, or other means in violation of the election laws, attempts to influence any person in giving his vote or ballot or by such means attempts to deter him from voting; (ii) furnishes a ballot to a person who he knows cannot understand the language in which the ballot is printed and misinforms him as to the content of the ballot with an intent to deceive him and induce him to vote contrary to his desire; or (iii) changes a ballot of a person to prevent the person from voting as he desired, shall be guilty of a Class 1 misdemeanor.

This section applies to any election and to any method used by a political party for selection of its nominees and for selection of delegates to its conventions and meetings.

§ 24.2-1007. Soliciting or accepting bribe to influence or procure vote.

No person shall solicit or accept directly or indirectly any money or any thing of value to influence his or another's vote in any election. Any person violating the provisions of this section shall be guilty of a Class 1 misdemeanor.

This section applies to any election and to any method used by a political party for selection of its nominees and for selection of delegates to its conventions and meetings.

STATUTES ON VOTE FRAUD AND VOTER INTIMIDATION - WASHINGTON

**RCW 29A.84.130**

**Voter violations.**

Any person who:

(1) Knowingly provides false information on an application for voter registration under any provision of this title;

(2) Knowingly makes or attests to a false declaration as to his or her qualifications as a voter;

(3) Knowingly causes or permits himself or herself to be registered using the name of another person;

(4) Knowingly causes himself or herself to be registered under two or more different names;

(5) Knowingly causes himself or herself to be registered in two or more counties;

(6) Offers to pay another person to assist in registering voters, where payment is based on a fixed amount of money per voter registration;

(7) Accepts payment for assisting in registering voters, where payment is based on a fixed amount of money per voter registration; or

(8) Knowingly causes any person to be registered or causes any registration to be transferred or canceled except as authorized under this title,

is guilty of a class C felony punishable under RCW 9A.20.021.

**RCW 29A.84.140**

**Unqualified registration.**

A person who knows that he or she does not possess the legal qualifications of a voter and who registers to vote is guilty of a class C felony.

**RCW 29A.84.620**

**Hindering or bribing voter.**

Any person who uses menace, force, threat, or any unlawful means towards any voter to hinder or deter such a voter from voting, or directly or indirectly offers any bribe, reward, or any thing of value to a voter in exchange for the voter's vote for or against any person or ballot measure, or authorizes any person to do so, is guilty of a class C felony punishable under RCW 9A.20.021.

**RCW 29A.84.630**

**Influencing voter to withhold vote.**

Any person who in any way, directly or indirectly, by menace or unlawful means, attempts to influence any person in refusing to give his or her vote in any primary or special or general election is guilty of a gross

misdemeanor punishable to the same extent as a gross misdemeanor that is punishable under RCW 9A.20.021.

**RCW 29A.84.640**

**Solicitation of bribe by voter.**

Any person who solicits, requests, or demands, directly or indirectly, any reward or thing of value or the promise thereof in exchange for his or her vote or in exchange for the vote of any other person for or against any candidate or for or against any ballot measure to be voted upon at a primary or special or general election is guilty of a gross misdemeanor punishable to the same extent as a gross misdemeanor that is punishable under RCW 9A.20.021.

**RCW 29A.84.650**

**Repeaters.**

(1) Any person who intentionally votes or attempts to vote in this state more than once at any election, or who intentionally votes or attempts to vote in both this state and another state at any election, is guilty of a class C felony.

(2) Any person who recklessly or negligently violates this section commits a class 1 civil infraction as provided in RCW 7.80.120.

**RCW 29A.84.655**

**Repeaters — Unqualified persons — Officers conniving with.**

Any precinct election officer who knowingly permits any voter to cast a second vote at any primary or general or special election, or knowingly permits any person not a qualified voter to vote at any primary or general or special election, is guilty of a class C felony punishable under RCW 9A.20.021.

**RCW 29A.84.660**

**Unqualified persons voting.**

Any person who knows that he or she does not possess the legal qualifications of a voter and who votes at any primary or special or general election authorized by law to be held in this state for any office whatever is guilty of a class C felony punishable under RCW 9A.20.021.

## STATUTES ON VOTE FRAUD AND VOTER INTIMIDATION – WEST VIRGINIA

### **§3-9-10. Disorder at polls; prevention; failure to assist in preventing disorder; penalties.**

Any person who shall, by force, menace, fraud or intimidation, prevent or attempt to prevent any officer whose duty it is by law to assist in holding an election, or in counting the votes cast thereat, and certifying and returning the result thereof, from discharging his duties according to law; or who shall, by violence, threatening gestures, speeches, force, menace or intimidation, prevent or attempt to prevent an election being held; or who shall in any manner obstruct or attempt to obstruct the holding of an election, or who shall, by any manner of force, fraud, menace or intimidation, prevent or attempt to prevent any voter from attending any election, or from freely exercising his right of suffrage at any election at which he is entitled to vote, shall be guilty of a misdemeanor, and, upon conviction, fined not more than one thousand dollars, or confined in the county jail for not more than one year, or both, in the discretion of the court.

Any person who, being thereto commanded by the commissioners of election, or either of them, shall fail or refuse to assist to the utmost of his power, in whatever may be necessary or proper to prevent intimidation, disorder or violence at the polls, shall be guilty of a misdemeanor, and, upon conviction thereof, shall be fined not less than ten nor more than one hundred dollars.

### **§3-9-13. Buying or selling vote unlawful; penalties.**

(a) It is unlawful for any person to offer or to pay money or any other thing of value to any person as consideration for the vote of the offeree or payee, as the case may be, to be cast for or against any candidate or issue in any election held in the state. Any person who violates the provisions of this subsection shall be guilty of a felony, and, upon conviction thereof, shall be fined not less than five thousand dollars or imprisoned for a period of not less than one year, nor more than five years, or both.

(b) It is likewise unlawful for any person to accept or agree to accept money or other thing of value as consideration for the vote of the acceptee, to be cast for or against any candidate or issue in any election held in the state. Any person who violates the provisions of this subsection shall be guilty of a misdemeanor, and, upon conviction thereof, shall be fined not less than one hundred dollars nor more than one thousand dollars or imprisoned in the county jail not more than one year, or both.

### **§3-9-16. Receiving or soliciting bribes by voters; penalties.**

Any voter who shall, before or during any election, directly or indirectly, by himself, or by any other person on his behalf, solicit, demand, receive, agree or contract for any money, gift, loan, or valuable consideration, office, place of employment, or solicit any endorsement on a note or other paper, public or private, for himself or for any other person, for voting or agreeing to vote, or for voting for any person or candidate or object, or agreeing so to vote, or from refraining or agreeing to refrain from voting at any election; or any person who shall, after any election, directly or indirectly, by himself, or by any other person on his behalf, solicit, demand or receive any money or valuable consideration on account of any person having voted or refrained from voting, or having induced any other person to vote or refrain from voting at any election, shall be guilty of a misdemeanor, and, on conviction thereof, shall be fined not more than one thousand dollars, or confined in jail for not more than one year, or both, in the discretion of the court.

### **§3-9-17. Illegal voting; deceiving voters; penalties.**

If any person knowingly votes when not legally entitled; or votes more than once in the same election; or knowingly votes or attempts to vote more than one ballot for the same office, or on the same question; or procures or assists in procuring an illegal vote to be admitted, or received, at an election, knowing the same to be illegal; or a legal vote to be rejected, knowing the same to be legal; or, with intent to deceive, alters the ballot of a voter by marking out the name of any person for whom such voter desires to vote; or, with like intent, writes the name of any person on such ballot other than those directed by the voter; or with like intent, makes any alteration thereof, whether such ballot be voted or not; or defrauds any voter at any election, by deceiving and causing him to vote for a different person for any office than he intended or desired to vote for, he shall be guilty of a misdemeanor, and, on conviction thereof, shall for each offense be fined not more than one thousand dollars or confined in the county jail for not more than one year, or both, in the discretion of the court.

STATUTES ON VOTE FRAUD AND VOTER INTIMIDATION - WISCONSIN

**12.09 Election threats. (1)** No person may personally or through an agent make use of or threaten to make use of force, violence, or restraint in order to induce or compel any person to vote or refrain from voting at an election.

**(2)** No person may personally or through an agent, by abduction, duress, or any fraudulent device or contrivance, impede or prevent the free exercise of the franchise at an election.

**(3)** No person may personally or through an agent, by any act compel, induce, or prevail upon an elector either to vote or refrain from voting at any election for or against a particular candidate or referendum.

**12.11 Election bribery. (1)** In this section, "anything of value" includes any amount of money, or any object which has utility independent of any political message it contains and the value of which exceeds \$1. The prohibitions of this section apply to the distribution of material printed at public expense and available for free distribution if such materials are accompanied by a political message.

**(1m)** Any person who does any of the following violates this chapter:

**(a)** Offers, gives, lends or promises to give or lend, or endeavors to procure, anything of value, or any office or employment or any privilege or immunity to, or for, any elector, or to or for any other person, in order to induce any elector to:

1. Go to or refrain from going to the polls.
2. Vote or refrain from voting.
3. Vote or refrain from voting for or against a particular person.
4. Vote or refrain from voting for or against a particular referendum; or on account of any elector having done any of the above.

**(b)** Receives, agrees or contracts to receive or accept any money, gift, loan, valuable consideration, office or employment personally or for any other person, in consideration that the person or any elector will, so act or has so acted.

**(c)** Advances, pays or causes to be paid any money to or for the use of any person with the intent that such money or any part thereof will be used to bribe electors at any election.

**(2)** This section applies to any convention or meeting held for the purpose of nominating any candidate for any election, and to the signing of any nomination paper.

**(3) (a)** This section does not prohibit a candidate from publicly stating his or her preference for or support of any other candidate for any office to be voted for at the same election. A candidate for an office in which the person elected is charged with the duty of participating in the election or nomination of any person as a candidate for office is not prohibited from publicly stating or pledging his or her preference for or support of any person for such office or nomination.

**(b)** This section does not apply to money paid or agreed to be paid for or on account of authorized legal expenses which were legitimately incurred at or concerning any election.

**(c)** This section does not apply where an employer agrees that all or part of election day be given to its employees as a paid holiday, provided that such policy is made uniformly applicable to all similarly situated employees.

**(d)** This section does not prohibit any person from using his or her own vehicle to transport electors to or from the polls without charge.

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(e) This section does not apply to any promise by a candidate to reduce public expenditures or taxes.

**12.13 Election fraud. (1) ELECTORS.** Whoever intentionally does any of the following violates this chapter:

- (a) Votes at any election or meeting if that person does not have the necessary elector qualifications and residence requirements.
- (b) Falsely procures registration or makes false statements to the municipal clerk, board of election commissioners or any other election official whether or not under oath.
- (c) Registers as an elector in more than one place for the same election.
- (d) Impersonates a registered elector or poses as another person for the purpose of voting at an election.
- (e) Votes more than once in the same election.
- (f) Shows his or her marked ballot to any person or places a mark upon the ballot so it is identifiable as his or her ballot.
- (g) Procures an official ballot and neglects or refuses to cast or return it. This paragraph does not apply to persons who have applied for and received absentee ballots.
- (h) Procures, assists or advises someone to do any of the acts prohibited by this subsection.

**(2) ELECTION OFFICIALS.** (a) The willful neglect or refusal by an election official to perform any of the duties prescribed under chs. 5 to 12 is a violation of this chapter.

(b) No election official may:

1. Observe how an elector has marked a ballot unless the official is requested to assist the elector; intentionally permit anyone not authorized to assist in the marking of a ballot to observe how a person is voting or has voted; or disclose to anyone how an elector voted other than as is necessary in the course of judicial proceedings.
2. Illegally issue, write, change or alter a ballot on election day.
3. Permit registration or receipt of a vote from a person who the official knows is not a legally qualified elector or who has refused after being challenged to make the oath or to properly answer the necessary questions pertaining to the requisite requirements and residence; or put into the ballot box a ballot other than the official's own or other one lawfully received.
4. Intentionally assist or cause to be made a false statement, canvass, certificate or return of the votes cast at any election.
5. Willfully alter or destroy a poll or registration list.
6. Intentionally permit or cause a voting machine, voting device or automatic tabulating equipment to fail to correctly register or record a vote cast thereon or inserted therein, or tamper with or disarrange the machine, device or equipment or any part or appliance thereof; cause or consent to the machine, device or automatic tabulating equipment being used for voting at an election with knowledge that it is out of order or is not perfectly set and adjusted so that it will correctly register or record all votes cast thereon or inserted therein; with the purpose of defrauding or deceiving any elector, cause doubt for what party, candidate or proposition a vote will be cast or cause the vote for one party, candidate or proposition to be cast so it appears to be cast for another; or remove, change or mutilate a ballot on a voting machine, device or a ballot to be inserted into automatic tabulating equipment, or do any similar act contrary to chs. 5 to 12.
- 6m. Obtain an absentee ballot for voting in a nursing home or qualified retirement home or qualified community-based residential facility under s. 6.875 (6) and fail to return the ballot to the issuing officer.
7. In the course of the person's official duties or on account

of the person's official position, intentionally violate or intentionally cause any other person to violate any provision of chs. 5 to 12 for which no other penalty is expressly prescribed.

8. Intentionally disclose the name or address of any elector who obtains a confidential listing under s. 6.47 (2) to any person who is not authorized by law to obtain that information.

**(3) PROHIBITED ACTS.** No person may:

(a) Falsify any information in respect to or fraudulently deface or destroy a certificate of nomination, nomination paper, declaration of candidacy or petition for an election, including a recall petition or petition for a referendum; or file or receive for filing a certificate of nomination, nomination paper, declaration of candidacy or any such petition, knowing any part is falsely made.

(am) Fail to file an amended declaration of candidacy as provided in s. 8.21 with respect to a change in information filed in an original declaration within 3 days of the time the amended declaration becomes due for filing; or file a false declaration of candidacy or amended declaration of candidacy. This paragraph applies only to candidates for state or local office.

(b) Wrongfully suppress, neglect or fail to file nomination papers in the person's possession at the proper time and in the proper office; suppress a certificate of nomination which is duly filed.

(c) Willfully or negligently fail to deliver, after having undertaken to do so, official ballots prepared for an election to the proper person, or prevent their delivery within the required time, or destroy or conceal the ballots.

(d) Remove or destroy any of the supplies or conveniences placed in compartments or polling booths.

(e) Prepare or cause to be prepared an official ballot with intent to change the result of the election as to any candidate or referendum; prepare an official ballot which is premarked or which has an unauthorized sticker affixed prior to delivery to an elector; or deliver to an elector an official ballot bearing a mark opposite the name of a candidate or referendum question that might be counted as a vote for or against a candidate or question.

(f) Before or during any election, tamper with voting machines, voting devices or automatic tabulating equipment readied for voting or the counting of votes; disarrange, deface, injure or impair any such machine, device or equipment; or mutilate, injure or destroy a ballot placed or displayed on a voting machine or device, or to be placed or displayed on any such machine, device or automatic tabulating equipment or any other appliance used in connection with the machine, device or equipment.

(g) Falsify any statement relating to voter registration under chs. 5 to 12.

(h) Deface, destroy or remove any legally placed election campaign advertising poster with intent to disrupt the campaign advertising efforts of any candidate, or of any committee, group or individual under ch. 11, or alter the information printed thereon so as to change the meaning thereof to the disadvantage of the candidate or cause espoused. Nothing in this paragraph restricts the right of any owner or occupant of any real property, or the owner or operator of any motor vehicle, to remove campaign advertising posters from such property or vehicle.

(i) Falsely make any statement for the purpose of obtaining or voting an absentee ballot under ss. 6.85 to 6.87.

(j) When called upon to assist an elector who cannot read or write, has difficulty in reading, writing or understanding English,

(b) This section does not apply to money paid or agreed to be paid for or on account of authorized legal expenses which were legitimately incurred at or concerning any election.

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(c) This section does not apply where an employer agrees that all or part of election day be given to its employees as a paid holiday, provided that such policy is made uniformly applicable to all similarly situated employees.

(d) This section does not prohibit any person from using his or her own vehicle to transport electors to or from the polls without charge.

(e) This section does not apply to any promise by a candidate to reduce public expenditures or taxes.

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(b) Falsely procures registration or makes false statements to the municipal clerk, board of election commissioners or any other election official whether or not under oath.

(c) Registers as an elector in more than one place for the same election.

(d) Impersonates a registered elector or poses as another person for the purpose of voting at an election.

(e) Votes more than once in the same election.

(f) Shows his or her marked ballot to any person or places a mark upon the ballot so it is identifiable as his or her ballot.

(g) Procures an official ballot and neglects or refuses to cast or return it. This paragraph does not apply to persons who have applied for and received absentee ballots.

(h) Procures, assists or advises someone to do any of the acts prohibited by this subsection.

**(2) ELECTION OFFICIALS.** (a) The willful neglect or refusal by an election official to perform any of the duties prescribed under chs. 5 to 12 is a violation of this chapter.

(b) No election official may:

1. Observe how an elector has marked a ballot unless the official is requested to assist the elector; intentionally permit anyone not authorized to assist in the marking of a ballot to observe how a person is voting or has voted; or disclose to anyone how an elector voted other than as is necessary in the course of judicial proceedings.

2. Illegally issue, write, change or alter a ballot on election day.

3. Permit registration or receipt of a vote from a person who the official knows is not a legally qualified elector or who has refused after being challenged to make the oath or to properly answer the necessary questions pertaining to the requisite requirements and residence; or put into the ballot box a ballot other than the official's own or other one lawfully received.

4. Intentionally assist or cause to be made a false statement, canvass, certificate or return of the votes cast at any election.

5. Willfully alter or destroy a poll or registration list.

6. Intentionally permit or cause a voting machine, voting device or automatic tabulating equipment to fail to correctly register or record a vote cast thereon or inserted therein, or tamper with or disarrange the machine, device or equipment or any part or appliance thereof; cause or consent to the machine, device or automatic tabulating equipment being used for voting at an election with knowledge that it is out of order or is not perfectly set and adjusted so that it will correctly register or record all votes cast thereon or inserted therein; with the purpose of defrauding or deceiving any elector, cause doubt for what party, candidate or proposition a vote will be cast or cause the vote for one party, candidate or proposition to be cast so it appears to be cast for another; or remove, change or mutilate a ballot on a voting machine, device

or a ballot to be inserted into automatic tabulating equipment, or do any similar act contrary to chs. 5 to 12.

6m. Obtain an absentee ballot for voting in a nursing home or qualified retirement home or qualified community-based residential facility under s. 6.875 (6) and fail to return the ballot to the issuing officer.

7. In the course of the person's official duties or on account of the person's official position, intentionally violate or intentionally cause any other person to violate any provision of chs. 5 to 12 for which no other penalty is expressly prescribed.

8. Intentionally disclose the name or address of any elector who obtains a confidential listing under s. 6.47 (2) to any person who is not authorized by law to obtain that information.

**(3) PROHIBITED ACTS.** No person may:

(a) Falsify any information in respect to or fraudulently deface or destroy a certificate of nomination, nomination paper, declaration of candidacy or petition for an election, including a recall petition or petition for a referendum; or file or receive for filing a certificate of nomination, nomination paper, declaration of candidacy or any such petition, knowing any part is falsely made.

(am) Fail to file an amended declaration of candidacy as provided in s. 8.21 with respect to a change in information filed in an original declaration within 3 days of the time the amended declaration becomes due for filing; or file a false declaration of candidacy or amended declaration of candidacy. This paragraph applies only to candidates for state or local office.

(b) Wrongfully suppress, neglect or fail to file nomination papers in the person's possession at the proper time and in the proper office; suppress a certificate of nomination which is duly filed.

(c) Willfully or negligently fail to deliver, after having undertaken to do so, official ballots prepared for an election to the proper person, or prevent their delivery within the required time, or destroy or conceal the ballots.

(d) Remove or destroy any of the supplies or conveniences placed in compartments or polling booths.

(e) Prepare or cause to be prepared an official ballot with intent to change the result of the election as to any candidate or referendum; prepare an official ballot which is premarked or which has an unauthorized sticker affixed prior to delivery to an elector; or deliver to an elector an official ballot bearing a mark opposite the name of a candidate or referendum question that might be counted as a vote for or against a candidate or question.

(f) Before or during any election, tamper with voting machines, voting devices or automatic tabulating equipment readied for voting or the counting of votes; disarrange, deface, injure or impair any such machine, device or equipment; or mutilate, injure or destroy a ballot placed or displayed on a voting machine or device, or to be placed or displayed on any such machine, device or automatic tabulating equipment or any other appliance used in connection with the machine, device or equipment.

(g) Falsify any statement relating to voter registration under chs. 5 to 12.

(h) Deface, destroy or remove any legally placed election campaign advertising poster with intent to disrupt the campaign advertising efforts of any candidate, or of any committee, group or individual under ch. 11, or alter the information printed thereon so as to change the meaning thereof to the disadvantage of the candidate or cause espoused. Nothing in this paragraph restricts the right of any owner or occupant of any real property, or the owner or operator of any motor vehicle, to remove campaign advertising posters from such property or vehicle.

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- (i) Falsely make any statement for the purpose of obtaining or voting an absentee ballot under ss. 6.85 to 6.87.
- (j) When called upon to assist an elector who cannot read or write, has difficulty in reading, writing or understanding English, or is unable to mark a ballot or depress a lever or button on a voting machine, inform the elector that a ballot contains names or words different than are printed or displayed on the ballot with the intent of inducing the elector to vote contrary to his or her inclination, intentionally fail to cast a vote in accordance with the elector's instructions or reveal the elector's vote to any 3rd person.
- (k) Forge or falsely make the official endorsement on a ballot or knowingly deposit a ballot in the ballot box upon which the names or initials of the ballot clerks, or those of issuing clerks do not appear.
- (L) When not authorized, during or after an election, break open or violate the seals or locks on a ballot box containing ballots of that election or obtain unlawful possession of a ballot box with official ballots; conceal, withhold or destroy ballots or ballot boxes; willfully, fraudulently or forcibly add to or diminish the number of ballots legally deposited in a ballot box; or aid or abet any person in doing any of the acts prohibited by this paragraph.
- (m) Fraudulently change a ballot of an elector so the elector is prevented from voting for whom the elector intended.
- (n) Receive a ballot from or give a ballot to a person other than the election official in charge.
- (o) Vote or offer to vote a ballot except as has been received from one of the inspectors.
- (p) Receive a completed ballot from a voter unless qualified to do so.
- (q) Solicit a person to show how his or her vote is cast.
- (r) Remove a ballot from a polling place before the polls are closed.
- (s) Solicit another elector to offer assistance under s. 6.82 (2) or 6.87 (5), except in the case of an elector who is blind or visually impaired to the extent that the elector cannot read a ballot.
- (t) Obtain an absentee ballot as the agent of another elector under s. 6.86 (3) and fail or refuse to deliver it to such elector.
- (u) Provide false documentation of identity for the purpose of inducing an election official to permit the person or another person to vote.
- (v) Corroborate any information offered by a proposed elector for the purpose of permitting the person to register to vote or to vote, knowing such information to be false.
- (w) Falsify a ballot application under s. 6.18.
- (x) Refuse to obey a lawful order of an inspector made for the purpose of enforcing the election laws; engage in disorderly behavior at or near a polling place; or interrupt or disturb the voting or canvassing proceedings.
- (y) After an election, break the locks or seals or reset the counters on a voting machine except in the course of official duties carried out at the time and in the manner prescribed by law; or disable a voting machine so as to prevent an accurate count of the votes from being obtained; or open the registering or recording compartments of a machine with intent to do any such act.
- (z) Tamper with automatic tabulating equipment or any record of votes cast or computer program which is to be used in connection with such equipment to count or recount votes at any election so as to prevent or attempt to prevent an accurate count of the votes from being obtained.
- (ze) Compensate a person who obtains voter registration forms from other persons at a rate that varies in relation to the number of voter registrations obtained by the person.

(zm) Willfully provide to a municipal clerk false information for the purpose of obtaining a confidential listing under s. 6.47 (2) for that person or another person.

(zn) Disclose to any person information provided under s. 6.47 (8) when not authorized to do so.

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STATUTES ON VOTE FRAUD AND VOTER INTIMIDATION - WYOMING

22-26-102. Registration offenses.

- (a) Registration offenses consist of performing any of the following acts with the intent to deceive a registration official or to subvert the registration requirements of the law or rights of a qualified elector:
- (i) Signing or offering to sign an application to register when not a qualified elector or to register under a false name;
  - (ii) Soliciting, procuring, aiding, abetting, inducing or attempting to solicit, procure, aid, abet or induce a person to register under the name of any other person, or a false name, or to register when not a qualified elector;
  - (iii) Destroying or altering a registration record when not authorized by law;
  - (iv) False swearing after being challenged.

22-26-106. False voting.

- (a) False voting consists of:
- (i) Voting, or offering to vote, with the knowledge of not being a qualified elector entitled to vote at the election;
  - (ii) Voting, or offering to vote, in the name of another person or under a false name;
  - (iii) Knowingly voting, or offering to vote, in a precinct other than that in which qualified to vote;
  - (iv) Voting, or offering to vote, more than once in an election.

22-26-109. Offering bribe.

- (a) Offering bribe consists of willfully advancing, paying, offering to pay or causing to be paid, or promising, directly or indirectly, any money or other valuable thing to a person, for any of the following purposes:
- (i) To induce a person to vote or refrain from voting for or against a candidate or ballot proposition or to sign or not sign a petition;
  - (ii) To induce an election official to mark, alter, suppress or change a ballot that has been cast, an election return, any certificate of election, or petition.

22-26-110. Accepting bribe.

Accepting a bribe consists of knowingly accepting any payment or promise of payment, directly or indirectly, of money or other valuable thing for any of the unlawful purposes specified in W.S. 22-26-109.

22-26-111. Intimidation.

- (a) Intimidation consists of:
- (i) Inducing, or attempting to induce, fear in an election official or elector by use of threats of force, violence, harm or loss, or any form of economic retaliation, for the purpose of impeding or preventing the free exercise of the elective franchise or the impartial administration of the Election Code; or
  - (ii) Soliciting the contribution of funds, other items of value or election assistance to the campaign of any candidate, candidate's committee, political action committee or sponsors of a ballot proposition, by use of threats of physical violence or any form of economic or official retaliation.
- (b) It is not a defense to a prosecution under this section that the defendant did not in fact possess the ability to carry out the threat made.

**Remarks by Paul DeGregorio  
Chairman, US Election Assistance Commission  
Voter Fraud/Intimidation Conference – Salt Lake City, Utah  
Center for Public Policy & Administration  
September 29, 2006**

Good afternoon, ladies and gentlemen. My name is Paul DeGregorio and I am the Chairman of the U.S. Election Assistance Commission. I would like to extend my thanks to Michael Alvarez, Thad Hall and Susan Hyde for organizing this conference and for inviting me to speak with you this afternoon.

My remarks today will focus on Voter Fraud and Voter Intimidation and how HAVA and the EAC address these issues.

The subject of voter fraud and voter intimidation can be a highly contentious issue. Since the 2004 election there has been a lot of discourse and writing about what constitutes election fraud and voter intimidation and how prevalent each may be in our society. While there are no clear numbers on the incidents of voter fraud and voter intimidation, what is clear is that the many groups are concerned about both issues and it is imperative that we continue to study and address them.

As you know, the EAC was created by The Help America Vote Act or "HAVA". HAVA represents the first major piece of federal legislation on national election reforms. Among other provisions, Section 241 of HAVA requires the EAC to conduct research on election administration issues. Among the tasks the EAC is to execute is the development of nationwide statistics and

methods of identifying, deterring, and investigating voting fraud and voter intimidation in elections for Federal office.

In September of 2005 the Commission hired consultants to begin a study of voting fraud and voter intimidation. This research project is charged with the development of a clear definition of what constitutes voting fraud and voter intimidation in Federal elections; identifying current activities of key government agencies, civic advocacy groups, and other organizations regarding these topics; the establishment of a working group of experts to discuss these issues; and production of a report to the EAC summarizing the findings that includes recommendations for future research if any. Our staff is reviewing the report that was submitted to the EAC last month and we expect to share our findings in the near future.

The lack of any solid statistics regarding voter fraud and intimidation can be attributed to two major factors. First is because there is wide disagreement about the definitions for the terms “fraud” and “intimidation.” Some only consider it fraud if it falls under the criminal definitions of fraud. While others consider any form of an ineligible voter attempting to vote as fraud. I have even had it suggested to me that election officials who allow voters to cast ballots on touch screen machines without a voter-verified paper trail is election fraud. If that’s the case, then we have a whole lot of fraud occurring out there.

The term intimidation is also wrought with ambiguity. Some only consider it intimidation if there is a physical or mental advantage of one party over the other, while others consider any difficulty in

the voting process as being intimidation. Because of these definitional differences there has been no clear way to study the amount of fraud or intimidation because everyone is using a different definition to help shape the statistics.

Also skewing the statistics about election fraud and voter intimidation is the political agenda or bias from both sides that accompanies much of the literature about the topic. Oftentimes we see fiery rhetoric on this issue that appears to me to want to “scare” people into voting or not voting. As a result of this political bias and the ambiguity that accompanies the terms “fraud” and “intimidation,” it is difficult to know when something has risen to the level to be considered fraud or simply is an accusation with no backing.

HAVA has several provisions that not only help to combat fraud but also make voting easier. Most notably section 303 of HAVA which requires each state to create “... a single, uniform, official, centralized, interactive, computerized statewide voter registration list...” This database is to be maintained at the state level and is to contain the name and registration information of every legally registered voter in the State.

The Statewide voter registration database is to serve as the single system for storing and managing the official list of registered voters throughout the state. It will be coordinated with other agencies databases within the state in order to insure the residence status of the voter.

The Statewide Voter Database serves a very important and specific function. It helps to prevent opportunities for fraud by allowing state election officials to check their registration information against the databases of other agencies in order to insure the status of the voters. Under HAVA, state election officials are given the right to remove those names that have been checked against state agency death records. Used correctly and efficiently, this would clearly help eliminate the problem of the use of a deceased person's name to vote or allow authorities to go after those who sign a dead person's name in the initiative or candidate petition process.

Also in section 303 of HAVA, State election officials are required to regularly update the registration list, removing only those individuals who are ineligible to vote in that election while updating the status of those eligible to vote. It is in this way that HAVA is helping to eliminate opportunities for fraud by eliminating ineligible voters from registration lists, while easing the process for those voters who are eligible.

One issue that has become particularly contentious is the issue of voter identification to combat voter fraud. As many of you know voter identification laws have lead to suits in Georgia, Indiana, Missouri, Ohio and Arizona with more to follow as states pass more identification laws.

In 2005-2006 the EAC commissioned research on voter identification practices in the 2004 election. To the surprise of no one the study found a lot of disagreement regarding the need for

voter identification laws and the way these laws should be applied.

Those in favor of voter identification laws argue that their goal is to ensure that only those legally entitled to vote do so, and do so only once at each election. They propose stricter voter identification requirements to prevent one form of voter fraud -- that being multiple voting or voting by those who are not eligible.

However, opponents argue that stricter ID laws interfere with legitimate voter's access to the ballot. They fear that some voters may lack convenient access to the required ID documents. Both sides assert that their policy will engender faith in the electoral process among citizens.

At the heart of this entire debate is the balance that needs to be struck between allowing those who are eligible to vote the ability to vote while preventing those who are not eligible to vote from voting.

From my own personal experience in traveling the world to improve the election process, especially in emerging democracies in Eastern Europe, Africa and Asia, I witnessed little, if any, resistance to ID requirements, including photo ID requirements. Indeed, I believe the Carter-Baker Commission has cited this phenomenon in their recommendations on this issue. In the recent Presidential election in Haiti, which is the poorest country in the Western Hemisphere, voters were required to show a photo ID to cast ballots. Statistics provided by IFES showed that over 3 million Haitian citizens, or about 80% of the voting age population,

registered to vote at centers that took their picture and fingerprints, and that produced the ID they used on Election Day. These IDs were paid for by the Organization of American States. On Election Day, 60% of the registered Haitians went to the polls, used their IDs, and cast ballots in the presidential election. By the way the 60% turnout matched the 2004 turnout in the US presidential election.

I cite this example and the Carter-Baker study to suggest that the first step that should be taken in order to find this balance is that more research needs to be conducted on the issue of voter identification. As was noted by the EAC's research, the amount of evidence available on how voter identification laws impacted both voter turnout and voter fraud is limited, at best. As more and more states implement these laws more information needs to be gathered in order to discover if these laws are preventing fraud, and what their impact is on voter turnout.

Courts have also greatly disagreed on the impact of voter identification laws. A recent decision in Georgia granted a preliminary injunction to enjoin the State of Georgia from requiring photo identification to be able to cast a ballot in person. The court in reaching its decision concluded that the injury to a voter who couldn't get the proper identification in time to vote was great and could not be tolerated. The court did point out that a State has a legitimate and important interest in attempting to combat voter fraud and in turn ensure the integrity of its elections.

This case is a perfect example of the struggle that legislatures, election officials, and courts are having with the issue of voter

fraud and voter identification. Most, if not all, recognize voter fraud as something that compromises the integrity of elections, but to what level are we willing to burden the legitimate voter to prevent this fraud from occurring?

Voter intimidation also has little valuable statistical information available. Again this is because “voter intimidation” is difficult to define and has rarely been prosecuted.

Many of the accusations of voter intimidation are brought against poll workers, most of whom are unaware of the possible intimidation taking place. For instance many of the accusations of intimidation by poll workers stem from poll workers making improper demands for identification, or poll workers questioning voters in what is a manner perceived as aggressive or intimidating. The solution to this problem is simple, proper poll worker training. Through proper training poll workers will know when and how ID or other verification documents are to be presented and the proper way to question voters at the polls. Also revisions to challenger laws can bring about more clarity about appropriate challenges and therefore less accusations of voter intimidation.

As more statistics are kept and the form and frequency of voter intimidation is better understood, states will be better prepared to prevent instances of voter intimidation and further improve the integrity of their elections. The EAC will continue work in this area so that we can hopefully see less rhetoric and more voter participation and trust in our elections.

Since I will be leaving the EAC in the not-too-distant future, I would like to take a few minutes to discuss the immense accomplishments of the EAC since I became a commissioner in December of 2003:

First, we distributed the 3 billion dollars that Congress appropriated to the states to improve their voting equipment and processes. This was truly an historic event in the field of American election administration.

Also, the EAC delivered the HAVA-mandated voluntary voting system guidelines (VVSG) within proscribed the 9-month deadline. As we develop future versions of the guidelines, we will be looking into the use of new technology and devices, as well as new software that is being created for current voting systems. Next Monday we will publish in the Federal Register the draft of our new Voting System Certification Program that we expect to finalize in December. I think you will find that this program will be a lot more rigorous and transparent than anything we have ever seen before. I encourage you to review it and give us your comments.

During the past 33 months we have issued guidance to states on statewide databases, accessibility requirements and how to use HAVA funds. And our new Inspector General and his staff are working vigorously to audit and account for the funds we distributed. On a daily basis we answer questions and offer guidance for election officials throughout the USA and indeed from all over the world.

In order to further support local election officials in this crucial election year we have released quick start guides on new voting systems, voting system security and testing, and poll worker recruitment and training. These guides provide a snapshot of processes and procedures for local election administrators to use when implementing new voting systems and security and testing older ones. It includes tips on receiving and testing equipment, poll worker training, security issues, and Election Day operations. In 2007, as part of our Clearinghouse responsibilities, we plan to distribute more comprehensive and detailed guides on these same important subjects.

In addition to the research projects that we have begun regarding election fraud and intimidation, we have several other research and data collection projects underway that will provide election officials and the public with valuable data to be used to improve the integrity of our elections. Already underway are studies on a number of topics including effective designs for ballots, polling places and websites; best practices for poll worker training, recruitment and retention, a study on vote count and recount procedures and the 2006 Election Day survey.

The HAVA College Poll Worker Program has awarded a total of almost \$1 Million in grants to help recruit a new generation of poll workers. Research is underway to find the best methods to recruit train and retain college poll workers.

We are also working hard to make sure the public is kept up to date on the future of elections and how it will affect the voting process. During tenure as Chairman we have held six public

meetings throughout the country. The topics that we have covered in these meetings include: How voting systems are certified, The National Voter Registration Act, Vote Count and Recount Procedures, Poll Workers, Effective management guidelines for voting systems, effective ballot and polling place designs, better ways to serve military and other overseas voters, voter information websites, and the EAC voting system certification program. As you can see, with a staff of just 23 people--and that number includes the Commissioners--we have accomplished a great deal in our short period of existence.

Twenty one years ago, I was probably the only one in this room who was heavily engaged as a professional election administrator. I have seen a lot of change since that time and no more so than in the past 5 years. Since the passage of HAVA, the nation has experienced significant changes in the electoral process. New voting systems have been purchased, replacing the antiquated systems that had been in place for decades. New statewide databases are in place. No one should be turned away at the polls anymore as provisional voting is the law of the land. Disabled voters, elderly voters and voter with language barriers have new tools that make it easier for them to cast their ballot.

Is America better off for all this change? You bet we are. Is the system perfect and free from errors, flaws, fraud and intimidation? Certainly not.

On November 7<sup>th</sup>, can voters have full trust and confidence in the election results that come out of all of these new devices, laws and procedures? In my view, they certainly can.

It's been an honor for me to have served at this historic time on this small but remarkable federal agency that touches the lives of every American. During my time on the commission, I have come to know many of you and of your deep conviction to help American improve and strengthen our system of democracy. And I want to thank you for your work and for the strong support you have given me and the commission since our start a mere 3 years ago.

You may know that during the 10 years preceding my appointment to the EAC, I worked as hard as I could to improve the election process in many emerging democracies throughout the globe. Whether it was in Congo or Cambodia, Russia or Romania, Slovakia or Sierra Leone, those 10 years were truly a wonderful opportunity that allowed me to touch the hearts and minds of many peoples, and experience firsthand the many similarities and few differences we actually have among each other in this world. I will be forever grateful to President George W. Bush for giving me the opportunity to do and experience the exact same thing in the United States of America while on the EAC. Thank you.



## **CALTECH/MIT VOTING TECHNOLOGY PROJECT**

**A multi-disciplinary, collaborative project of  
the California Institute of Technology – Pasadena, California 91125 and  
the Massachusetts Institute of Technology – Cambridge, Massachusetts  
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### **ELECTION FRAUD REFERENCES**

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**ELECTION CRIMES BRANCH**  
**LIST OF DISTRICT ELECTION OFFICERS (DEOs) - 2006**

<u>DISTRICT</u>	<u>DISTRICT ELECTION OFFICER</u>	<u>PHONE NUMBER</u>	<u>E-MAIL</u>
Alabama -Middle	Kent B. Brunson	334-223-7280	Kent.Brunson@usdoj.gov
Alabama-Northern	John P. "Pat" Meadows	205-244-2214	Pat.Meadows@usdoj.gov
Alabama-Southern	Vicki Davis	251-441-5845	Vicki.Davis@usdoj.gov
Alaska	Deborah M. Smith	907-271-5071	Deb.Smith@usdoj.gov
Arizona	Gary Restaino	602-514-7756	Gary.Restaino@usdoj.gov
Arkansas-Eastern	John Ray White	501-340-2621	John.White2@usdoj.gov
Arkansas-Western	Christopher Plumlee	479-783-5125	Christopher.D.Plumlee@usdoj.gov
California-Central	Dennis Mitchell	213-894-2484	Dennis.Mitchell@usdoj.gov
California-Eastern (Sacramento)	Debora Luther	916-554-2700/2720	Debora.Luther@usdoj.gov
California-Eastern (Fresno)	Stanley Boone	559-498-7442 D	Stanley.Boone@usdoj.gov
California-Northern	Michael Wang	415-436-6767	Michael.Wang@usdoj.gov
California-Southern	Christopher P. Tenorio	619-557-7843	Christopher.Tenorio@usdoj.gov
Colorado	Tom O'Rourke	303-454-0209	Thomas.O'Rourke@usdoj.gov
District of Columbia	Steve Bunnell	202-514-6988	Steve.Bunnell@usdoj.gov
Connecticut	Cal Kurimai	203-821-3700	Cal.Kurimai@usdoj.gov
Delaware	Leonard P. Stark	302-573-6277 x 106	Leonard.Stark@usdoj.gov
Florida-Middle	Robert Mosakowski	813-274-6129 813-274-6177	Robert.Mosakowski@usdoj.gov
Florida-Northern	Gregory Miller, USA	850-942-8430	Gregory.Miller@usdoj.gov
Florida-Southern	Karen Rochlin	305-961-9234	Karen.Rochlin@usdoj.gov
Georgia-Middle	Harry J. Fox	478-752-3511	Harry.Fox@usdoj.gov
Georgia-Northern	William Toliver	404-581-6069	William.Toliver@usdoj.gov
Georgia-Southern	Jay Weimer	706-724-0517	Jay.Weimer@usdoj.gov
Guam (Saipan)	Marivic P. David	671-472-7332 x 120	Marivic.David@usdoj.gov
Saipan	John Rice	670-236-2980	John.Rice@usdoj.gov
Hawaii	Ron Johnson	808-541-2850	Ron.Johnson@usdoj.gov
Idaho (Boise)	George Breitsameter	208-334-1211	George.Breitsameter@usdoj.gov
Idaho (Pocatello)	Jack Haycock	208-478-4166	Jack.Haycock@usdoj.gov
Idaho (Coeur d' Alene)	Nancy Cook	208-667-6568 208-676-7346 D	Nancy.Cook@usdoj.gov

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<u>DISTRICT</u>	<u>DISTRICT ELECTION OFFICER</u>	<u>PHONE NUMBER</u>	<u>E-MAIL</u>
Illinois-Central (Springfield)	Gregory Gilmore	217-492-4419/4450	Greg.Gilmore@usdoj.gov
Illinois-Central (Urbana)	David Hoff	217-373-5875	David.Hoff@usdoj.gov
Illinois-Central (Peoria & Rock Island)	Darilynn Knauss	309-671-7050 309-671-7357 D	Darilynn.Knauss@usdoj.gov
Illinois-Northern	Steve Heinze	312-886-1265	Stephen.Heinze@usdoj.gov
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Indiana-Northern	Bernie Van Wormer	219-937-5500	Bernie.Van.Wormer@usdoj.gov
Indiana-Southern	Tim Morrison	317-226-6333	Tim.Morrison@usdoj.gov
Iowa-Northern (Cedar Rapids)	Daniel Tvedt	319-363-6333 D	Dan.Tvedt@usdoj.gov
Iowa-Northern (Sioux City)	Janet Petersen	712-255-6011	Janet.Petersen@usdoj.gov
Iowa-Southern	Robert Dopf	515-284-6280	Robert.Dopf@usdoj.gov
Kansas	Leon Patton	913-551-6730	Leon.Patton@usdoj.gov
Kentucky-Eastern	James A. Zerhusen	859-233-2661	Jim.Zerhusen@usdoj.gov
Kentucky-Western	Tom Dyke	502-582-5911	Tom.Dyke@usdoj.gov
Louisiana-Eastern	Irene Gonzalez	504-680-3077	Irene.Gonzalez@usdoj.gov
Louisiana-Middle	Richard Bourgeois	225-389-0443	Richard.Bourgeois@usdoj.gov
Louisiana-Western	William Flanagan	318-676-3624	William.Flanagan@usdoj.gov
Maine (Bangor)	Jim McCarthy	207-945-0373	James.McCarthy@usdoj.gov
Maine (Portland)	Rick Murphy	207-780-3257	Rick.Murphy@usdoj.gov
Maryland	Steven Dunne	301-344-4433	Steven.Dunne@usdoj.gov
Massachusetts	Brian Kelly	617-748-3197	Brian.Kelly@usdoj.gov
Michigan-Eastern	Pamela Thompson	313-226-9770	Pamela.Thompson@usdoj.gov
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Minnesota	Tricia Tingle	612-664-5600	Tricia.Tingle@usdoj.gov
Mississippi-Northern	John R. Hailman	662-238-7633	John.Hailman@usdoj.gov
Mississippi-Southern	Don Burkhalter	601-965-4480	Don.Burkhalter@usdoj.gov
Missouri-Eastern	John Bodenhausen	314-539-7613	John.Bodenhausen@usdoj.gov
Missouri-Western	Dan Stewart	816-426-4160	Dan.Stewart@usdoj.gov
Montana	Joshua S. VandeWetering	406-542-8851	Josh.Vandewetering@usdoj.gov
Nebraska (Lincoln)	Paul Boeshart	402-437-5241/5136	Paul.Boeshart@usdoj.gov
Nevada	Camille Damm	702-388-6223	Camille.Damm@usdoj.gov

New Hampshire	Peter Papps	603-225-1552	Peter.Papps@usdoj.gov
New Jersey	Susan Steele	973-645-2990/2700	Susan.Steele@usdoj.gov
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New Mexico	Jonathon Gerson	505-346-7274	Jonathon.Gerson@usdoj.gov
<b><u>DISTRICT</u></b>	<b><u>DISTRICT ELECTION OFFICER</u></b>	<b><u>PHONE NUMBER</u></b>	<b><u>E-MAIL</u></b>
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New York-Southern	Andrew Dember	212-637-2563	Andy.Dember@usdoj.gov
New York-Southern	Andrew Schilling	212-637-2721	Andrew.Schilling@usdoj.gov
New York-Western	Trini Ross	716-843-5700 x-805	Trini.E.Ross@usdoj.gov
North Carolina-Eastern	Bobby Higdon	919-856-4103	Bobby.Higdon@usdoj.gov
North Carolina-Middle	Benjamin H. White, Jr.	336-333-5351	Ben.White@usdoj.gov
North Carolina-Western (Asheville)	Richard Edwards	828-259-0651 D 828-271-4661	Richard.Edwards2@usdoj.gov
North Carolina-Western (Charlotte)	Mike Savage	704-344-6222 704-338-3166 D	Mike.Savage2@usdoj.gov
North Dakota	Rick Volk	701-530-2420	Rick.Volk@usdoj.gov
Ohio-Northern (Cleveland)	Ann C. Rowland	216-622-3847	Ann.Rowland@usdoj.gov
Ohio-Northern (Toledo)	David O. Bauer	419-241-0728 D	David.Bauer@usdoj.gov
Ohio-Southern (Columbus)	Gary Spartis	614-255-1610	Gary.Spartis@usdoj.gov
Ohio-Southern (Dayton)	J. Richard Chema	937-225-2910	Richard.Chema@usdoj.gov
Ohio-Southern (Cincinnati)	Ralph W. Kohnen	513-684-3711	Ralph.Kohnen@usdoj.gov
Oklahoma-Eastern	Dean Burris	918-684-5164	Dean.Burris@usdoj.gov
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<b>Tennessee-Western</b>	<b>David Kustoff, USA,</b>		<b>WDTN</b>
Texas-Eastern	Michelle Englade	409-981-7928 D	Michelle.Englade@usdoj.gov
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<b><u>DISTRICT</u></b>	<b><u>DISTRICT ELECTION OFFICER</u></b>	<b><u>PHONE NUMBER</u></b>	<b><u>E-MAIL</u></b>
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Detecting Attempted Election Theft: Vote Counts, Voting  
Machines and Benford's Law \*

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April 19, 2006

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Fraudulent elections and disputes about election outcomes are nothing new. Gumbel (2005) reviews the sorry history of deceit and electoral manipulation in America, going back to the dawn of the republic. Throughout the world, in old and new democracies alike, allegations of vote fraud frequently occur (Lehoucq 2003). One new element is voting technologies that make some familiar methods for physically verifying the accuracy of vote totals impossible to use. The advent of electronic voting machines means that often now there are no paper ballots to be recounted. To steal an election it is no longer necessary to toss boxes of ballots in the river, stuff the boxes with thousands of phony ballots, or hire vagrants to cast repeated illicit votes. All that may be needed nowadays is access to an input port and a few lines of computer code. To detect such manipulations is a difficult and urgent problem. In terms of legitimacy it is not clear whether the worse problem is that erroneous election outcomes may occur or that many may not believe that correct outcomes are valid.

This paper introduces statistical methods intended to help detect election fraud. Other methods, using regression-based techniques for outlier detection, have previously been proposed to help detect election anomalies (e.g. Wand, Shotts, Sekhon, Mebane, Herron, and Brady 2001; Mebane, Sekhon, and Wand 2001). The methods described here are distinctive in that they do not require that we have covariates to which we may reasonably assume the votes are related across political jurisdictions. For one set of methods I describe—methods based on tests of the distribution of the digits in reported vote counts—all that is needed are the vote counts themselves. I study the application of those methods to both precinct-level and voting machine-level vote tabulations. Part of the potential practical relevance of these methods is that situations in which little more than the vote counts are available may arise frequently in connection with actual election controversies.

The other set of methods I describe, which are based on testing whether votes are randomly assigned to the voting machines used for a voting precinct, require candidate vote totals disaggregated to the level of individual voting machines. More than that, these methods also require that a fair amount is known about how the voting machines were used. For instance, for voting machines used during early voting periods,<sup>1</sup> we need to know on which days particular

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<sup>1</sup>See Gronke, Bishin, Stevens, and Galanes-Rosenbaum (2005) for a discussion of early voting in Florida during the 2004 election.

machines were used, and at which early voting site. In fact it may be useful to know the exact time at which each vote was cast and on which machine. Such details are routinely available when some kinds of electronic voting machines are used, except that it may not be possible to tell when a particular vote was cast: transaction event logs maintained for each machine indicate when a vote was cast, but to help protect the secret ballot it is not possible to match an individual vote record (an individual ballot image) with a particular transaction.

Both methods depend in different ways on ideas about voter behavior. The methods that check whether votes are randomly assigned to machines assume that voters' choices between candidates do not depend on the particular voting machine they use. If a set of machines are all used in the same precinct during the same period of time, and yet the distribution of vote choices varies significantly across machines, then the idea is to attribute the variation to some kind of manipulation. Perhaps voters with different preferences were somehow directed to use different machines. Or perhaps some of the machines were hacked.

The methods that check the distribution of the digits in reported vote counts depend on ideas about voter choice behavior that differ substantially from the models usually used in research on political behavior. The digit-test methods are based on the expectation that the second digits of vote counts should satisfy Benford's Law (Hill 1995). Benford's Law specifies that the ten possible second digits should not occur with equal frequency. A fundamental question is why we should expect Benford's Law to apply to vote count data. Even though some have proposed to use the second-digit Benford's Law distribution to test for fraudulent votes (e.g., Pericchi and Torres 2004), prominent election monitors have strongly disputed such proposals (Carter Center 2005). I suggest that a behavioral focus on the individualized uncertainty in each person's vote choice may be inappropriate when thinking about vote counts for the purpose of trying to decide whether the counts are fraudulent. Indeed, leaving aside questions of vote fraud, to the extent that the familiar kinds of behavioral models cannot in general produce vote counts with second digits that follow the Benford's Law distribution—and, in general, they cannot—the fact that vote counts do often satisfy Benford's Law is strong evidence that the familiar behavioral models do not describe the votes people actually cast.

Even if Benford's Law typically describes vote count data, it does not follow that deviations from Benford's Law indicate election fraud. I present the results of some simulation exercises that

begin exploring what if any kinds of vote fraud a test based on the second-digit Benford's Law distribution can detect. In the limited range of simulations I have conducted so far, I find that the Benford's Law test is sensitive to some kinds of manipulation of vote counts but not to others. The test seems sensitive enough to warrant further exploration of its properties. I think it has an excellent chance of developing into a standard tool for forensically auditing elections.

I apply both the vote randomization test and the Benford's Law test to data from three Florida counties in the 2004 general election. The available data include ballot image and voting machine event log files for electronic early voting and electronic polling place votes in Broward, Miami-Dade and Pasco counties, including labels identifying the precinct and voting machine for each ballot.<sup>2</sup>

## A Randomization Test for Voting Machines

The first test addresses whether the distribution of the votes is the same on all of each precinct's voting machines. The idea is to assess whether the votes cast in each precinct were randomly and independently assigned to each machine used in the precinct. A manipulation of the vote that affected some machines but not others would probably cause the distribution of the votes among candidates to differ on the affected machines. Testing that the split of the votes is the same on all the machines used in a precinct is one way to check for such selective manipulation. Voter preferences vary substantially from precinct to precinct, but if a collection of machines is used to count the votes in a precinct, with all of the machines being used throughout the same period of time, and if each voter has the same probability of being assigned to each machine, then the split of the votes should be roughly the same on all of the precinct's machines.

To define the test, let  $\pi_{ijk}$  denote the probability that voter  $i$  in precinct  $j$  is assigned to vote using machine  $k$ , and let  $\rho_{ijkl}$  denote the probability that voter  $i$  in precinct  $j$  using machine  $k$  chooses candidate  $l$ . The number of voters in precinct  $j$  is  $n_j$ , the number of machines is  $m_j$ , and

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<sup>2</sup>The ballot image and event log file data were supplied by David Dill. Additional data regarding characteristics of the machines used in Miami-Dade were supplied by Martha Mahoney. For more information about data sources see the Data Note.

$\sum_{k=1}^{m_j} \pi_{ijk} = 1$ . The number of votes expected for candidate  $l$  in precinct  $j$  on machine  $k$  is

$$V_{jkl} = \sum_{i=1}^{n_j} \pi_{ijk} \rho_{ijkl},$$

and the expected vote share for candidate  $l$  in precinct  $j$  on machine  $k$  is

$$R_{jkl} = \left( \sum_{i=1}^{n_j} \pi_{ijk} \right)^{-1} V_{jkl}.$$

If the probability of being assigned to a machine is the same for each voter in precinct  $j$ , then  $\pi_{ijk} = \pi_{jk}$ . If neither the choice the voter makes nor the choice that is recorded depends on either the machine or on how other voters are assigned to machines, then  $\rho_{ijkl} = \rho_{ijl}$ . If both of these conditions hold, the number of votes expected for candidate  $l$  in precinct  $j$  on machine  $k$  is

$$\tilde{V}_{jkl} = \pi_{jk} \sum_{i=1}^{n_j} \rho_{ijl},$$

and the expected machine vote share is

$$\tilde{R}_{jkl} = \frac{\tilde{V}_{jkl}}{n_j \pi_{jk}} = n_j^{-1} \sum_{i=1}^{n_j} \rho_{ijl}.$$

In this case the vote share expected for candidate  $l$  is the same for all the machines in precinct  $j$ .

**Remark 1** For candidate  $l$  in precinct  $j$ , for all voters  $i = 1, \dots, n_j$  and all machines  $k = 1, \dots, m_j$ , suppose that (a) the probability of being assigned to a machine is the same for each voter ( $\pi_{ijk} = \pi_{jk}$ ) and (b) the vote choice does not depend on the machine or on how other voters are assigned to machines ( $\rho_{ijkl} = \rho_{ijl}$ ). Then the same vote share is expected for candidate  $l$  on every machine used to count votes in the precinct, i.e.,

$$\text{for all } k, k' = 1, \dots, m_j, \quad \tilde{R}_{jkl} = \tilde{R}_{jk'l} = n_j^{-1} \sum_{i=1}^{n_j} \rho_{ijl}. \quad (1)$$

If condition (1) holds, then the proportion of votes cast for candidate  $l$  on one machine in a precinct should not be systematically different from the proportion of votes cast for  $l$  on the other machines in the precinct. The proportion for  $l$  on the other machines should tend to be a good

predictor for the proportion observed on machine  $k$ . When computing these predictor proportions I add small constants to both the numerator and denominator counts in cases where candidate  $l$  receives no votes on some set of  $m_j - 1$  machines in a precinct, and I add small constants to the denominator counts in cases where candidate  $l$  receives all the votes on some set of  $m_j - 1$  machines. These adjustments avoid making excessively sharp predictions. Formally, let  $n_{jk}$  denote the number of votes observed in precinct  $j$  on each machine  $k$ , with  $n_{jkl}$  denoting the number of votes on that machine for candidate  $l$ . Let  $\delta_{kk'} = 1$  if  $k = k'$ , otherwise  $\delta_{kk'} = 0$ . Assuming  $m_j > 1$ , , define adjustment indicators  $z_{jl}$  and  $a_{jl}$ :

$$z_{jl} = \begin{cases} 1, & \text{if, for any } k = 1 \dots m_j, \sum_{k'=1}^{m_j} (1 - \delta_{kk'}) n_{jk'l} = 0 \\ 0, & \text{otherwise,} \end{cases}$$

$$a_{jl} = \begin{cases} 1, & \text{if, for any } k = 1 \dots m_j, \sum_{k'=1}^{m_j} (1 - \delta_{kk'}) n_{jk'l} = \sum_{k'=1}^{m_j} (1 - \delta_{kk'}) n_{jk'k} \\ 0, & \text{otherwise.} \end{cases}$$

Assuming  $m_j > 1$ , the proportion of votes for  $l$  predicted for machine  $k$ , using the votes for  $l$  on the machines other than  $k$  in precinct  $j$ , is

$$\check{p}_{jkl} = \frac{\sum_{k'=1}^{m_j} (1 - \delta_{kk'}) (n_{jk'l} + z_{jl}/2)}{\sum_{k'=1}^{m_j} (1 - \delta_{kk'}) (n_{jk'k} + z_{jl}/2 + a_{jl}/2)}, \quad (2)$$

The adjustment indicators cause the constant  $1/2$  to be added to all the counts for machines in a precinct if any machine in the precinct would otherwise be facing a predicted proportion of zero or one based on the votes recorded on the other machines in the precinct.

I use the Pearson chi-squared statistic to implement a randomization test of whether (1) holds for each precinct. For precinct  $j$  the test statistic is

$$X_{jl}^2 = \sum_{k=1}^{m_j} \frac{(n_{jkl} - n_{jk}\check{p}_{jkl})^2}{n_{jk}\check{p}_{jkl}}.$$

Remark 1's assumptions (a) and (b) imply that every distribution of the observed votes among each precinct's  $m_j$  machines is equally likely, subject to the constraint that the number of votes on each machine remains constant throughout the permutations of the votes. Hence we may test

for (1) by checking whether the value of  $X_{jl}^2$  obtained using the observed data is large compared to the values obtained over all possible permutations of the observed votes. We fix the machine totals  $n_{jk}$  and the total number of votes for candidate  $l$  across all of the machines but shuffle the votes among the machines to obtain new sets of counts, say  $n_{jkl}^*$ . The constraint that the total number of votes for candidate  $l$  across all of the machines is fixed means that

$\sum_{k=1}^{m_j} n_{jkl}^* = \sum_{k=1}^{m_j} n_{jkl}$ . For each set of shuffled votes we compute the chi-squared statistic,

$$X_{jl}^{2*} = \sum_{k=1}^{m_j} \frac{(n_{jkl}^* - n_{jk}\tilde{p}_{jkl}^*)^2}{n_{jk}\tilde{p}_{jkl}^*},$$

where  $\tilde{p}_{jkl}^*$  denotes the predicted proportion (2) computed using the shuffled data. Because the number of permutations of the votes is large even for moderate numbers of votes and machines, I use a Monte Carlo approach that involves randomly sampling permutations in order to approximate the probabilities of observing values of  $X_{jl}^{2*}$  as large as  $X_{jl}^2$  or larger given the hypothesis that Remark 1's assumptions (a) and (b) hold. That is, assuming that (a) and (b) of Remark 1 hold, I estimate

$$g_{jl} = \text{Prob} \left( X_{jl}^{2*} \geq X_{jl}^2 \mid m_j, \{n_{jk} : k = 1, \dots, m_j\}, \sum_{k=1}^{m_j} n_{jkl} \right).$$

Let  $\hat{g}_{jl}$  denote the Monte Carlo estimate of  $g_{jl}$ .

To combine the test results from the many precincts there are to assess from each county, I use the false discovery rate (FDR) (Benjamini and Hochberg 1995; Benjamini and Yekutieli 2005). The randomization method treats each precinct independently, so it is appropriate to use the form of the FDR that assumes independence. Benjamini and Hochberg (1995) define this FDR as follows. For candidate  $l$ , sort the values  $\hat{g}_{jl}$  from all  $J$  precincts from smallest to largest. Let  $\hat{g}_{(j)l}$  denote these ordered values, with  $\hat{g}_{(1)l}$  being the smallest. For a chosen test level  $\alpha$  (e.g.,  $\alpha = .05$ ), let  $d$  be the smallest value such that  $\hat{g}_{(d+1)l} > (d+1)\alpha/J$ . This number  $d$  is the number of tests *rejected* by the FDR criterion. If Remark 1's assumptions (a) and (b) hold for all machines in all precincts, then we should find  $d = 0$ .

A limitation of this method is that in precincts where all or all but one of the machines have very small counts  $n_{jkl}$  or  $n_{jk} - n_{jkl}$ , the number of distinct possible values of  $X_{jl}^2$  may be too

small for the test based on the smallest observed tail probability to have any power. For instance, if  $\alpha = .05$  and  $J = 757$  (roughly the number of precincts in Miami-Dade County), then  $\alpha/J \approx .000066$ . A tail probability that small cannot occur in a precinct having three machines with  $n_{jk}$  values (1, 3, 1) and  $n_{jkl}$  values (1, 0, 0), as occurs in the ballot image data with the votes for president in one Miami-Dade election-day precinct. To mitigate this problem, I include in the analysis only precincts for which there are at least two machines  $k$  for which for candidate  $l$  we have both  $\sum_{k'=1}^{m_j} (1 - \delta_{kk'}) n_{jk'l} > 1$  and  $\sum_{k'=1}^{m_j} (1 - \delta_{kk'}) (n_{jk'l} - n_{jk'l}) > 1$ .<sup>3</sup>

## Data

I apply the randomization test to voting data from the 2004 general election in three Florida counties: Broward, Miami-Dade and Pasco (see the Data Note for details on sources and contents of the data). Table 1 shows the number of precincts in each county. On election day, some machines were used to record votes from more than one precinct. This occurred in cases where more than one precinct shared a polling place. Most voting occurred on election day, November 2, 2004, but the data also include votes cast during the 15-day early voting period (October 18 through November 1, 2004). Table 1 also shows the number of early voting sites used in each county (earlyvoting.org 2004; Miami-Dade County 2004; Browning 2004). In Broward and Pasco counties, voters from all precincts could vote at any early voting site. In Miami-Dade county, voters from each precinct could vote only at selected early voting locations. At early voting sites each voting machine was used for voters from multiple precincts. The voting data for the early voting period do not directly indicate the voter's precinct but instead indicate which of several ballot styles the voter used. Table 1 shows the number of styles used during early voting for each county.

\*\*\* Table 1 about here \*\*\*

The randomization test is meaningful for precinct  $j$  only if at least in principle every voter is equally likely to use each of the machines. The realities of voting in the Florida counties present some challenges to this requirement.

The most obvious challenges concern early voting. For much the same reason that we separate

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<sup>3</sup>Probably it would be better to include only precincts where there are at least  $1/\alpha$  possible permutations of the votes for candidate  $l$ , subject to holding constant the machine totals  $(n_{j1}, \dots, n_{jm_j})$ .

the election day votes cast in different precincts from one another, we would also like to avoid grouping together votes cast at different early voting sites. Voters using different sites probably live in different places and are likely to have significantly different preferences. Moreover, in Miami-Dade, not every ballot style was available on every voting machine at each early voting site, so not every voter could use every machine. Unfortunately, neither the ballot nor the event log files contained any indication of the physical location where each voting machine was used. I used Personal Electronic Ballot (PEB)<sup>4</sup> codes recorded in the event log files to group machines together, the idea being that machines for which the same PEB was used must have been located at the same early voting site.<sup>5</sup>

Another concern with early voting is that not every voting machine was used every day during the early voting period. I used the event log files to identify the dates during the early voting period when each voting machine was used. I grouped machines together only if they were used on all the same days. The “site-days” entries in Table 1 show the number of unique combinations of the PEB-based location groupings with these date groupings in Broward and Pasco counties, and the “style-site-days” entry shows the number of unique combinations of the PEB-based location and ballot style groupings with the date groupings in Miami-Dade County. These serve as the “precincts”  $j$  for the early voting randomization tests. The “site-day-machines” and “s-s-d-machines” entries show the number of unique combinations of the site-days or style-site-days groupings with voting machines. These are the “machines”  $k$  for the early voting randomization tests.

Much as machines being used on different days is a concern during the early voting period, there is also a potential problem due to machines being used at different times during each day. Figure 1 illustrates several patterns of potential concern. The plots in the figure show the times at which votes were cast on each voting machine on election day in four Miami-Dade precincts. Each row of letters in each plot indicates the time at which a “vote cast” transaction occurs for a voting machine in the event log files, with a letter being plotted at each point when a vote was recorded. There is one row of letters for each voting machine used in each precinct. Times are shown using

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<sup>4</sup>For a description of how PEBs are used in Election Systems & Software “iVotronic” voting machines, see (Electronic Frontier Foundation 2004).

<sup>5</sup>For Miami-Dade County it was possible to supplement the PEB information with copies of files that showed the location of all but 88 of the machines used during early voting. See the Data Note for details.

a 24-hour clock and resolved to the second. In precinct 109, most of the machines were used throughout the day, but the machine labeled “e” was not used after 10am. A reasonable guess is that the machine was pulled from service at that time. In precinct 233, the machine labeled “c” was not used after 8am, and the machine labeled “f” was not used before 2pm. In precinct 322, the machine labeled “b” was used only between 11:30am and 2:30pm. In precinct 326, the machines labeled “g” and “m” were used only after 1pm. If some machines were not available for use during substantial parts of the day, then Remark 1’s assumption (a) is not satisfied.

Questions about this assumption also arise for other machines that exhibit irregular usage. For instance, in precinct 109 the machine labeled “k” was used much less often in the afternoon than in the morning, and in precinct 326 the machine labeled “p” was used heavily only after 6pm.

\*\*\* Figure 1 about here \*\*\*

Instead of trying to exclude machines for which usage during the day seems not to match the pattern of the other machines in a precinct, I construct a measure of how similar the patterns of time usage are for a precinct’s machines and examine whether the measure is related to the tail probability estimates  $\hat{g}_{jl}$ . Let  $t_{jki}$  denote the time (in seconds) at which vote  $i$  was cast on machine  $k$  in precinct  $j$ . For each machine  $k$  in precinct  $j$ , I compute

$$\tau_{jk} = \frac{1 + (n_j - n_{jk})^{-2} \sum_{k'=1}^{m_j} (1 - \delta_{kk'}) \sum_{i=1}^{n_{jk}} \sum_{i'=1}^{n_{jk'}} (1 - \delta_{kk'}) |t_{jki} - t_{jk'i'}|}{1 + (n_{jk})^{-2} \sum_{i=1}^{n_{jk}} \sum_{h=1}^{n_{jk}} |t_{jki} - t_{jkh}|}.$$

The denominator measures the mean absolute difference among the times at which votes were cast on machine  $k$ , and the numerator measures the mean absolute difference between the times at which votes were cast on machine  $k$  and the times at which votes were cast on every other machine  $k'$  in precinct  $j$ . The ratio  $\tau_{jk}$  achieves the lower bound of 1.0 if the mean absolute difference among the voting times on machine  $k$  is the same as the mean absolute difference between the voting times on  $k$  and the voting times on the other machines. The ratio increases as the voting times on machine  $k$  tend to differ on average more from the times on the other machines than they differ from one another. To compute a summary measure for each precinct  $j$ , I compute the geometric mean of the ratios  $\tau_{jk}$ , namely,

$$\tau_j = \left( \prod_{k=1}^{m_j} \tau_{jk} \right)^{1/m_j}.$$

For the four precincts shown in Figure 1,  $\tau_j$  has the values  $\tau_{109} = 1.06$ ,  $\tau_{233} = 1.09$ ,  $\tau_{322} = 1.02$  and  $\tau_{326} = 1.05$ . The largest values for a machine in each of those precincts is  $\max_k(\tau_{109k}) = 4.2$ ,  $\max_k(\tau_{233k}) = 33.8$ ,  $\max_k(\tau_{322k}) = 3.5$  and  $\max_k(\tau_{326k}) = 1.8$ .

We might expect  $\hat{g}_{jl}$  to decrease as the dissimilarity between machines—measured by either  $\tau_j$  or  $\max_k(\tau_{jk})$ —increases. A weakness of this approach is that because it not possible to tell which ballot image corresponds to which event log entry, it is not possible to customize the vote-time dissimilarity measure for each candidate. Over all the votes cast, however, we can be reasonably sure that the times recorded in the event log files do correspond to the votes recorded in the ballot image files. Table 2 shows that for the most part the total counts of voting events and of ballot images are the same for each voting machine.

\*\*\* Table 2 about here \*\*\*

## Randomization Test Results

I examine the votes cast for the Republican and Democratic candidates for president (George W. Bush and John F. Kerry) and for U.S. Senator (Mel Martinez and Betty Castor). I also examine the votes Yes or No for eight state constitutional amendments that appeared on the ballot in Florida in 2004. These amendments are described in Table 3. In all cases I consider the shares for each candidate or for each amendment voting option out of all ballots cast, including in the denominator ballots for which no vote choice was indicated for the referent office or amendment. I analyze the early voting data separately from the election day data.

\*\*\* Table 3 about here \*\*\*

Figure 2 shows a typical pattern for the distribution of the estimates  $\hat{g}_{jl}$ . The values depicted are for election day precincts in Miami-Dade County. Most of the values are much larger than the test level  $\alpha = .05$ .

\*\*\* Figure 2 about here \*\*\*

There is no tendency for  $\hat{g}_{jl}$  to decrease as the dissimilarity in vote times between the machines in a precinct increases. The  $\hat{g}_{jl}$  values are not significantly correlated across precincts with either  $\tau_j$  or  $\max_k(\tau_{jk})$ . Indeed, for the Miami-Dade County election day data only seven of the twenty product moment correlations with each dissimilarity measure are negative, and the most negative

value found is  $\text{cor}(\hat{g}_{jl}, \max_k(\tau_{jk})) = -0.06$ , for the Amendment 3 No votes.<sup>6</sup> Similar results are found for the correlations between  $\log(\hat{g}_{jl})$  and  $\log(\tau_j)$  and between  $\log(\hat{g}_{jl})$  and  $\log(\log(\tau_j))$ .

The FDR test results reported in Tables 4, 5 and 6 do not provide much support for the idea that the votes cast in each precinct were randomly and independently assigned to each machine used in the precinct. For all three counties, in both the election day and the early voting data, there are many rejections of the hypothesis that (1) holds. There are somewhat more rejections among the election day vote counts. Pasco County early voting has the fewest rejections, with one rejection each for the Amendment 5 Yes votes and for the Amendment 7 No votes. For early voting in Broward County there are four rejections, for four of the amendment options. Notwithstanding the attempt to compare only similar machine counts to one another in the Miami-Dade County early voting data, by separating votes that occur at different sites, on different days and using different ballot styles, there are rejections in those data for nine of the twenty candidate and amendment options. The election day results show rejections for ten of the twenty options in Miami-Dade, thirteen of the twenty options in Broward and five of the twenty options in Pasco County.

\*\*\* Tables 4, 5 and 6 about here \*\*\*

On balance it seems unlikely that voting time dissimilarities between the machines in each precinct can explain the pattern of rejections for the election day votes. We have already reviewed the pattern of insignificant  $\text{cor}(\hat{g}_{jl}, \tau_j)$  and  $\text{cor}(\hat{g}_{jl}, \max_k(\tau_{jk}))$  values for the Miami-Dade election day data. For the Broward County data, only five of the  $\text{cor}(\hat{g}_{jl}, \tau_j)$  values and only six of the  $\text{cor}(\hat{g}_{jl}, \max_k(\tau_{jk}))$  values are negative, and all of those correlations are very small. The largest in magnitude is  $\text{cor}(\hat{g}_{jl}, \max_k(\tau_{jk})) = -0.04$  for the Amendment 6 No vote. For the Pasco county data, six  $\text{cor}(\hat{g}_{jl}, \tau_j)$  values and nine  $\text{cor}(\hat{g}_{jl}, \max_k(\tau_{jk}))$  values are negative, but these correlations are again small. The largest in magnitude does occur for one of the FDR rejections, namely the Amendment 7 No votes, for which  $\text{cor}(\hat{g}_{jl}, \tau_j) = -0.11$ . But  $\text{cor}(\hat{g}_{jl}, \tau_j) = -0.10$  for the Amendment 7 Yes votes, and for those votes there are no FDR rejections. For the votes for Bush and Kerry, which each show more than one FDR rejection,  $\text{cor}(\hat{g}_{jl}, \tau_j) > 0$ . For these latter two votes the  $\text{cor}(\hat{g}_{jl}, \max_k(\tau_{jk}))$  values are negative but small, respectively  $-0.03$  and  $-0.02$ . There is no significant relationship between the correlations  $\text{cor}(\hat{g}_{jl}, \tau_j)$  or  $\text{cor}(\hat{g}_{jl}, \max_k(\tau_{jk}))$  and the

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<sup>6</sup>The largest positive correlation in the Miami-Dade data is 0.11 for  $\tau_j$ , for the Amendment 5 No votes.

number of FDR rejections for a particular candidate or amendment option.<sup>7</sup>

## Using Benford's Law to Test for Fraudulent Votes

One method that has been suggested for testing whether reported vote totals are fraudulent is to compare the digits occurring in the vote counts to the distribution of digits expected under Benford's Law. Benford's Law specifies that the different digits should not occur with equal frequency. That is, each of the nine possible first significant digits (1, 2, . . . , 9) should not each occur one-ninth of the time, each of the ten possible second significant digits (0, 1, . . . , 9) should not each occur one-tenth of the time, and so forth. Instead, according to Benford's Law the first and second significant digits should occur with the frequencies shown in Table 7. Tests against Benford's Law have been promoted for use to detect fraud in forensic financial accounting (Durtschi, Hillison, and Pacini 2004). In the realm of vote count data the relevance of Benford's Law has been controversial. Pericchi and Torres (2004) use tests of the second digits of vote counts against the Benford's Law distribution to raise the prospect of fraud in the Venezuelan recall referendum of August 15, 2004. This charge was specifically denied in the Carter Center report (Carter Center 2005, 132–133), based on technical analysis reported in Brady (2005) and Taylor (2005).

\*\*\* Table 7 about here \*\*\*

Why should Benford's Law apply to vote count data? A fundamental result is that Benford's Law does not in general hold for data that are simply random (Raimi 1976; Hill 1995). This property is one basis for its proposed use in financial fraud detection. If someone uses numbers taken directly from a table of random numbers to fill out faked financial records, the digits will occur with equal frequency. The positive case for using Benford's Law with financial data is not altogether perspicuous, however. Durtschi et al. (2004), for instance, rely on the supposedly complicated origins of financial data as the rationale for expecting Benford's Law to hold:

“Boyle (1994) shows that data sets follow Benford's Law when the elements result

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<sup>7</sup>In the Broward County data, a Poisson regression of the number of FDR rejections on the values of  $\text{cor}(\log(\hat{g}_{jt}), \log(\max_k(\tau_{jk})))$  shows a marginally significant positive relationship: the coefficient estimate is 9.6 with a standard error of SE=5.8. But in the Miami-Dade County data the same kind of analysis shows a significant negative relationship between the same variables: the coefficient estimate is -18.1 (SE=4.9). In the Pasco County data the corresponding analysis produces a coefficient estimate of -1.9 (SE=6.0).

from random variables taken from divergent sources that have been multiplied, divided, or raised to integer powers. This helps explain why certain sets of accounting numbers often appear to closely follow a Benford distribution. Accounting numbers are often the result of a mathematical process. A simple example might be an account receivable which is a number of items sold (which comes from one distribution) multiplied by the price per item (coming from another distribution).” (Durtschi et al. 2004, 20–21)

The complexity rationale runs afoul of the way behavioral political scientists usually think about voting data. Students of voting behavior have developed a repertoire of models built on the idea that each individual’s vote choice is essentially a coin flip (i.e., a stochastic choice). For some elections the coin may have more sides than two, and for different people the probabilities of the various outcomes are different. But the overall vote counts are seen as merely the sum of all the different coin flip outcomes. Such a sum of random coin flips lacks the complexity needed to produce the Benford’s Law pattern in the vote counts’ digits. Taking voter turnout decisions into account does not essentially change the basic coin flip idea. In this case, to produce the coin flip probabilities the probability that each person votes is multiplied by the conditional probability that the person makes a particular choice among the candidates or ballot initiative options.

One can see this standard behavioral perspective at work in the analysis used to support the conclusions reached about the Venezuelan referendum by the Carter Center. This is most explicit in the analysis reported by Taylor (2005). Taylor writes, “we use the multinomial model (4) of a ‘fair election’ and find that its significant digit distribution is virtually identical to the observed distribution, which is different than Benford’s Law” (Taylor 2005, 22). Taylor also generates data using a Poisson model. As a general matter these two models are essentially the same—as Taylor (2005, 9) observes, the multinomial arises upon conditioning on the total of a set of Poissons. Neither has the complexity needed to produce digits that follow Benford’s Law.

The kind of complexity that can produce counts with digits that follow Benford’s Law refers to processes that are statistical mixtures (e.g., Janvresse and de la Rue (2004)), which means that random portions of the data come from different statistical distributions. There are some limits that apply to the extent of the mixing, however. If the number of distinct distributions is large, then the result is likely to be well approximated by some simple random process that does not

satisfy Benford's Law. So if we are to believe that in general Benford's Law should be expected to describe the digits in vote counts, we need to have a behaviorally realistic process that involves mixing among a small number of distributions.

Another issue concerns whether Benford's Law should be expected to apply to all the digits in reported vote counts. In particular, for precinct-level data there are good reasons to doubt that the first digits of vote counts will satisfy Benford's Law. Brady (2005) develops a version of this argument. The basic point is that often precincts are designed to include roughly the same number of voters. If a candidate has roughly the same level of support in all the precincts, which means the candidate's share of the votes is roughly the same in all the precincts, then the vote counts will have the same first digit in all of the precincts. Imagine a situation where all precincts contain about 1,000 voters, and a candidate has the support of roughly fifty percent of the voters in every precinct. Then most of the precinct vote totals for the candidate will begin with the digits '4' or '5.' This result will hold no matter how mixed the processes may be that get the candidate to roughly fifty percent support in each precinct. For Benford's Law to be satisfied for the first digits of vote counts clearly depends on the occurrence of brittle accidents in the distribution of precinct sizes and in the alignment of precinct sizes with each candidate's support. It is difficult to see how there might be some connection to generally occurring political processes. So we may turn to the second significant digits of the vote counts, for which at least there is no similar knock down contrary argument.

For an example that illustrates these ideas, consider Table 8. This table reports Pearson chi-squared statistics for two kinds of tests. First is whether the distributions of the first digits of the precinct vote counts for the major party candidates for president and for U.S. Senator and for the eight constitutional amendments on election day 2004 in Miami-Dade County match the distribution specified by Benford's Law. Second is whether the first digits occur equally often. For the Benford's Law test, let  $q_{B_1i}$  denote the expected relative frequency with which the first significant digit is  $i$ . These  $q_{B_1i}$  values are the values shown in the first line of Table 7. Let  $d_{1i}$  be the number of times the first digit is  $i$  among the  $J$  precincts being considered, and set

$d_1 = \sum_{i=1}^9 d_{1i}$ . The statistic for the first-digit Benford's Law test is

$$X_{B_1}^2 = \sum_{i=1}^9 \frac{(d_{1i} - d_1 q_{B_1 i})^2}{d_1 q_{B_1 i}}.$$

For the test that first digits occur equally frequently, the test statistic is

$$X_{U_1}^2 = \sum_{i=1}^9 \frac{(d_{1i} - d_1/9)^2}{d_1/9}.$$

Assuming independence across precincts, these statistics may be compared to the  $\chi^2$ -distribution with 8 degrees of freedom.<sup>8</sup> That distribution has a critical value of 15.5 for a .05-level test. Since all of the statistics reported in Table 8 greatly exceed that value, the hypothesis that the first significant digits follow Benford's Law may be handily rejected, as may be the hypothesis that the nine values (1–9) occur equally often.

\*\*\* Table 8 about here \*\*\*

In contrast, consider Table 9, which reports Pearson chi-squared statistics for tests of the distribution of the vote counts' second significant digits. For  $q_{B_2 i}$  denoting the expected relative frequency with which the second significant digit is  $i$  (given by the second line in Table 7), and with  $d_{2i}$  being the number of times the second digit is  $i$  among the  $J$  precincts being considered and  $d_2 = \sum_{i=0}^9 d_{2i}$ , the statistic for the second-digit Benford's Law test is

$$X_{B_2}^2 = \sum_{i=0}^9 \frac{(d_{2i} - d_2 q_{B_2 i})^2}{d_2 q_{B_2 i}}.$$

For the test that second digits occur equally frequently, the test statistic is

$$X_{U_2}^2 = \sum_{i=0}^9 \frac{(d_{2i} - d_2/10)^2}{d_2/10}.$$

These statistics may be compared to the  $\chi^2$ -distribution with 9 degrees of freedom, which has a critical value of 16.9 for a .05-level test. The results, reported in the first two columns of Table 9, give little reason to doubt that Benford's Law applies. Two of the twenty statistics are larger

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<sup>8</sup>The consequences of dependence are unclear. It may develop that calibration is necessary to establish the correct distribution, especially when the number of precincts is not large. Similar comments apply to the  $X_{B_2}^2$  and  $X_{U_2}^2$  statistics introduced for second digits below.

than the critical value for a .05-level test. But if we consider the twenty tests to be independent, then with a single-test level of  $\alpha = .05$ , using the FDR gives no reason to be concerned unless we obtain a statistic larger than 25.46 (with a single-test level of .10, using the FDR establishes a 23.59 as the value beyond which we should be concerned).<sup>9</sup> The largest  $X_{B_2}^2$  value in the first column of Table 9 is 17.9. The results give reason to reject the assumption that the second digits are equally likely to take any of the ten possible values. The largest  $X_{U_2}^2$  value in the second column of Table 9 is 25.3.

\*\*\* Table 9 about here \*\*\*

The remaining columns of Table 9 show that what works for precincts need not work for voting machines. The middle columns report the results of applying the tests to the vote counts on the individual voting machines used on election day in Miami-Dade County. Acknowledging that some voting machines in Miami-Dade recorded votes from more than one precinct on election day, the last two columns show results from applying the tests to vote counts for each unique precinct-machine combination. Both forms of the analysis firmly reject the idea that Benford's Law describes the distribution of the second significant digits of the vote counts on election day voting machines in Miami-Dade County.

### **Generating Vote Counts that Satisfy Benford's Law**

Is there a family of processes that are behaviorally plausible from a political point of view and that are capable of producing precinct-level vote counts that satisfy Benford's Law for the second significant digits but not for the first significant digits? Can we explain why such a process would produce precinct counts that satisfy the second-digit Benford's Law but not machine counts that do so?

The second question has an answer that does not depend on the details of how the precinct counts may be generated, so let's consider it first. The point is to remember that a random process that is not a mixture does not in general produce digits that satisfy Benford's Law. Using that fact, we can explain the non-Benford machine counts in cases where votes are randomly assigned to the voting machines being used in each precinct. If the probability that each vote cast

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<sup>9</sup>For 20 independent tests and single-test level  $\alpha = .05$ , the FDR gives  $0.0025 = .05/20$  as the first tail probability to be concerned about, which for the  $\chi^2$ -distribution with 9 degrees of freedom corresponds to a critical value of 25.46. The value of 23.59 is obtained analogously.

in precinct  $j$  is assigned to machine  $k$  is  $\pi_{jk}$ , then conditioning on the total number of votes cast in each precinct, the distribution of votes among the machines in precinct  $j$  is multinomial with outcomes proportional to  $\pi_j = (\pi_{j1}, \dots, \pi_{jn_j})$ . If the probability vectors  $\pi_j$  or the total number of votes cast vary across precincts, these multinomial distributions may vary considerably from precinct to precinct, but having a collection of vectors of counts each generated by a different multinomial distribution does not in general give counts that satisfy Benford's Law.

So what can produce precinct-level vote counts that satisfy the second-digit Benford's Law? For a behaviorally realistic process that involves mixing among a small number of distributions, we can think about political parties, or more generally about the coalitions that come together at election time. Usually each candidate (or each side) has a collection of core supporters. These core supporters are virtually certain to vote for their side. Viewed as coins, we might say these core supporters always come up "heads." Note that this virtual certainty of support for one candidate need not imply any loyalty to the candidate that lasts longer than election day. But at the time the candidate votes, it is there. Any voter who is not such a core supporter for any side may possibly vote for any of the available alternatives.<sup>10</sup> Using the mean probability that such available voters vote for each candidate, we obtain a model where the total vote for a candidate in each precinct is a mixture of two distributions: the distribution of core supporters and the distribution of available voters.

The following **R** (R Development Core Team 2003) function generates vote counts for one candidate across a set of simulated precincts from such a model.

```
pbenf <- function(size, nprecincts=500, lsplit=.1, hsplit=.1, bfrac=1/2) {
  z <- sapply(1:nprecincts,
    function(x){
      p2 <- c(runif(1,0,lsplit),runif(1,(1-hsplit),1));
      pf <- c(rbeta(1,1,bfrac),rbeta(1,bfrac,1));
      partypm <- rpois(2,size*pf/sum(pf));
      sum(votes <- rpois(length(partypm), lambda=partypm*p2))
    })
}
```

For each of the `nprecincts` simulated precincts the vector `p2` contains two numbers. The first

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<sup>10</sup>I think it may be better to distinguish between those voters who have firmly made up their minds for whom they will vote when they arrive at the polls and those who have not. This would give a distinction between, say, "committed" and "undecided" voters. In future drafts of this paper I will likely shift to something like that usage.

number, drawn uniformly from the interval  $[0, \text{lsplit}]$ , represents the probability that available voters vote for the candidate. The second number, drawn uniformly from the interval  $[1 - \text{hsplit}, 1]$ , represents the probability that the candidate's core voters vote for the candidate. The vector `pf` represents the proportion of the voters in each precinct who are expected to be of each type. With the default argument value `bfrac = 1/2`, the first, Beta-distributed value in `pf` has a mean of  $2/3$  and the second value has a mean of  $1/3$ . The vector `partypm` contains the Poisson-distributed expected number of voters of each type. The vector `votes` contains the vote counts for the candidate from each type of voters in each precinct. These are summed to give the overall number of votes for the candidate in each precinct.<sup>11</sup>

Tables 10 and 11 show the results of a Monte Carlo simulation exercise using function `pbenf` to generate precinct vote counts for various choices of the function's arguments. The parameter denoted Size in the table refers to the `size` argument, which is the expected number of voters in each precinct. All the precincts generated by one invocation of `pbenf` have the same expected number of voters, although the actual number, which is Poisson distributed, varies over precincts. The parameter denoted Split in the table refers to the `lsplit` argument (the `hsplit` argument always has the value 0.1). The values in the Mean Votes column indicate the number of votes the candidate is expected to receive in each precinct given the corresponding parameter values.<sup>12</sup>

\*\*\* Tables 10 and 11 about here \*\*\*

In Table 10 one can see that in most cases the simulated vote counts satisfy the second-digit Benford's Law. In Table 11 the simulated vote counts satisfy the second-digit Benford's Law for small values of `lsplit` and Size values up to about Size=2000, and for for larger values of `lsplit` and Size=3000, but mostly not for Size values 2250, 2500 and 2750. These results suggest that the electoral coalition model that features two types of voters for each candidate can generate vote counts with second digits that satisfy Benford's Law for a wide variety of parametric

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<sup>11</sup>If the only goal is to produce counts whose second digits usually satisfy the second-digit Benford's Law, then it is not necessary to have the expected number of voters (`partypm`) and the vote counts (`votes`) be Poisson distributed. If the `pbenf` function is changed to use the assignments `partypm <- size*pf/sum(pf)` and `votes <- partypm*p2`, then we get second-digit Benford's Law results very similar to those obtained for the baseline model for the conditions considered in the Monte Carlo simulations reported in Tables 10 and 11. This alternative specification demonstrates that the essential feature that produces the second-digit Benford's Law pattern is the mixture of the core and available voting groups, not variation that may occur in the sizes of voting precincts. Using the Poisson-distributed values may impart greater realism, and it is noteworthy that doing so does not reduce the function's ability to produce counts with digits that satisfy the second-digit Benford's Law.

<sup>12</sup>The `bfrac` argument always equals the default value, `bfrac = 1/2`.

configurations, although clearly not for all possible parameter values. Hence the electoral coalition model (or improved versions of it) may possibly explain the patterns we see in real election data. By the way, the vote counts produced by the `pbenf` function do not have first significant digits that satisfy the first-digit Benford's Law.

## Can Benford's Law Detect Vote Fraud?

Applying the second-digit Benford's Law test to other vote count data from the 2004 election in Florida produces some results that suggest that Benford's Law applies to the data and other results that raise questions. Table 12 reports results based on data from early voting in Miami-Dade county. Applying the FDR of Benjamini and Hochberg (1995) to the twenty tests for site-style-days, the results look fine if we use a single-test level of  $\alpha = .05$ , since no  $X_{B_2}^2$  value is greater than 25.46, but the results are problematic if  $\alpha = .10$  ( $X_{B_2}^2$  for the Amendment 7 Yes votes is 24.6, which is greater than 23.6). The election day precinct results for Broward, shown in Table 13, are similar. They are fine using the FDR with  $\alpha = .05$  but problematic using  $\alpha = .10$ : two of the Amendment vote counts have  $X_{B_2}^2 > 23.6$ . The Broward early voting results for counts at the level of ballot styles are fine if the FDR is used. The largest  $X_{B_2}^2$  value among these early voting tests is  $X_{B_2}^2 = 21.4$ , for the votes for Kerry. The election day results for Pasco, shown in Table 14, have one value of  $X_{B_2}^2$  large enough to reject the hypothesis that Benford's law applies even using the FDR among the twenty tests with  $\alpha = .05$ . This is the value  $X_{B_2}^2 = 29.5$ , which occurs for the Amendment 7 Yes votes. Considered on their own and using the FDR for twenty tests, the early voting machine-precinct results for Pasco are fine.

\*\*\* Tables 12, 13 and 14 about here \*\*\*

The results for voting machines in Tables 12, 13 and 14 further illustrate that the second-digit Benford's Law property mostly does not apply to the vote counts on machines in these Florida counties. The case that comes closest to being an exception is the machine results for early voting in Broward County. Many of those  $X_{B_2}^2$  values are unproblematically small, but three are larger than the  $\chi_9^2$  critical value for a single test at level  $\alpha = .05$ , and two are large even when we use the FDR. For the Amendment 8 Yes votes we have  $X_{B_2}^2 = 27.9$ , which is larger than the critical value for the FDR for twenty tests with  $\alpha = .05$ , and for the Amendment 7 Yes votes we have  $X_{B_2}^2 = 44.0$ , which is very large by any standard.

The value  $X_{B_2}^2 = 29.5$  that occurs for the election day precinct data from Pasco County is large enough to count as a rejection of the second-digit Benford's Law hypothesis even using the FDR among all 60 of the election day tests, pooling across the three counties: the quantile of  $\chi_9^2$  corresponding to a tail probability of  $.05/60$  is 28.35. If we pool over all 120 of the election day precinct and early voting site-style-day, style and machine-precinct tests, the value  $X_{B_2}^2 = 29.5$  is not problematic according to the FDR with  $\alpha = .05$ , since the quantile of  $\chi_9^2$  corresponding to a tail probability of  $.05/120$  is 30.13. But using  $\alpha = .10$  we again have a problem even when pooling over all 120 tests, because using the FDR we again arrive at the  $\chi_9^2$  quantile of 28.35.

Do the relatively large  $X_{B_2}^2$  values for the precinct-level vote counts suggest the counts have been fraudulently manipulated? The simulations reported in Tables 10 and 11 suggest that an electorally intelligible and benign process can produce counts that often satisfy the second-digit Benford's Law. Suppose we take a process that we know usually produces such counts and perturb it in ways that mimic some ways vote fraud may occur. Does the Benford's Law test signal that there has been a distortion? If so, we might conclude that the relatively large  $X_{B_2}^2$  values suggest that maybe there has been fraud. Because we know the Benford's Law test can fail even when there is nothing like fraud in the data generating process, such a result can do no more than suggest the possibility of fraud. But if the Benford's Law test does not catch perturbations that we inject into otherwise pristine data, then of course the test is not useful for detecting vote fraud. In this case the mostly clean precinct-level results should not give us any comfort.

I simulate three variations of each of two kinds of vote manipulation. The two basic manipulations I describe as (1) adding repeaters and (2) proportionally increasing or decreasing vote totals. The variations apply each manipulation either to all precincts or to precincts in which the unmanipulated votes fall above or below specified thresholds.

My conception of repeaters harks back to the classic manipulation Gumbel (2005) describes as having been perfected by several American city political machines in the late nineteenth and early twentieth centuries. Repeaters in the nineteenth century's Tammany Hall were the primary referents of the familiar phrase, "vote early and often." As Gumbel writes, "The repeaters carried changes of clothing, including several sets of coats and hats, so they could plausibly come forward a second or third or fourth time in the guise of an entirely new person.... Many of the repeaters sported full beards at the beginning of the day, only to end it clean-shaven" (Gumbel 2005, 74).

Nowadays repeaters might simply be a few lines of computer code hidden in a PEB.

I implement repeaters by adding to a candidate's vote total a number equal to a specified fraction of the expected number of voters in each precinct. The number of votes added does not depend on the number of votes the candidate would otherwise receive, so the number added is not a function of the candidate's true support. To implement this idea, I replace the last line in the function that is applied to each precinct in the `pbenf` function with the following two lines,

```
votes <- sum(rpois(length(partypm), lambda=partypm*p2))
votes + sum(partypm)*frac;
```

The argument `frac` specifies the fraction of the expected voter number that is to be added.

The idea of proportionally increasing or decreasing vote totals is intended to represent two kinds of situations. One is where votes from a candidate are simply tossed out. A proportional decrease in a candidate's votes corresponds to the case where a fixed proportion of the candidate's votes are discarded in each precinct. The other situation is where votes are swapped from one candidate to another candidate. The candidate from whom the votes are taken could suffer proportional decreases, while the candidate who is receiving the votes is experiencing proportional increases. It may be that the Benford's Law tests can detect either the decreases or the increases, but not both. I implement this idea by replacing the last line in the function that is applied to each precinct in the `pbenf` function with the following two lines,

```
votes <- sum(rpois(length(partypm), lambda=partypm*p2))
votes <- ceiling(votes*frac);
```

The argument `frac` specifies the proportion by which the votes are to be increased or decreased.

There are increases if `frac > 1` and decreases if `frac < 1`.

I also consider variations of repeaters and proportional adjustments in which the manipulations are done only for a subset of the precincts. The subset to which the manipulations are applied depends on the votes the candidate is receiving before the manipulation is applied. The threshold for applying the changes is always the number of votes the candidate is expected to receive in each precinct. For the simulation function `pbenf`, that expectation may be computed using the **R** code

```
meanpbenf <-
```

$$\text{size}*(1/(1+\text{bfrac}))*(\text{lsplit}/2) + \text{size}*(\text{bfrac}/(\text{bfrac}+1))*(1+\text{hsplit})/2;$$

The “Mean Votes” column in Tables 10 and 11 reports these expected vote values for a number of combinations of parameter values. In the case I designate as “below threshold,” the manipulation is applied if the candidate is receiving fewer than `meanpbenf` votes. In the “above threshold” case the manipulation is applied if the candidate is receiving more than `meanpbenf` votes.

In each case I simulate these vote manipulations starting with vote counts produced by `pbenf`, using parameters that tended to produce counts that satisfied the second-digit Benford’s Law for a wide range of expected numbers of voters in each precinct. In particular, referring to Tables 10 and 11, I use `Split = 0.1` (which is `lsplit = .1`). Using that `Split` value produced small values of  $X_{B_2}^2$  for expected numbers of voters per precinct (i.e., “Size”) ranging from 500 to 2,000 and precincts numbering from 500 to 1,000. Over that range of sizes, the Monte-Carlo estimated expected value of  $X_{B_2}^2$  is always smaller than the expected value of  $X_{U_2}^2$ , and often the expected value of  $X_{U_2}^2$  is very large.

The results in Table 15 show that the second-digit Benford’s Law test can sometimes but not always detect distortions from repeaters acting the same way in all precincts. The column labeled `Add` in the table shows the value of `frac`, which indicates how many votes were added as a fraction of the expected number of voters in each precinct. For example, with `Size = 500` and `Add = 0.05`, 25 votes were added to the candidates vote total in each precinct. We ask whether each averaged  $X_{B_2}^2$  statistic shown in the table exceeds the critical value for  $\chi_9^2$  for a test at level  $\alpha = .05$ , which is 16.9. For `Size = 2000` and 1,000 precincts, the average  $X_{B_2}^2$  value is always larger than 16.9, which suggests the Benford’s Law test would usually detect the manipulation in such precincts. With `Size = 2000` and 500 precincts, the average  $X_{B_2}^2$  is greater than 16.9 only for `Add = 0.10` or larger. So in such precincts it appears the test would usually detect repeaters only if they were as numerous as ten percent of the bona fide voters. With `Size = 1500`, the test typically triggers only for `Add` greater than 0.20. With `Size = 1000` or 500, the test triggers irregularly for some of the larger values of `Add`.

\*\*\* Table 15 about here \*\*\*

The results in Table 16 show that the Benford’s Law test is somewhat better able to signal manipulation when the repeater manipulation occurs in the precincts where the candidate is

otherwise getting more votes than would be expected based on the uncontaminated process, but the test does not do as well when the repeater manipulation is happening in precincts where the candidate is otherwise receiving fewer votes than would be expected. The averaged  $X_{B_2}^2$  values shown in the Above Threshold columns are typically larger than the corresponding columns in Table 15, while the averaged  $X_{B_2}^2$  values shown in the Below Threshold columns are typically smaller.

\*\*\* Table 16 about here \*\*\*

The results in Table 17 suggest that the Benford's Law test has only very limited ability to detect proportional increases or decreases in a candidate's vote that happen throughout all precincts. The "Prop." values in the table indicate the value of `frac` that was used. The values used range from a twenty percent reduction in the candidate's vote (Prop. = 0.8) to a twenty percent increase (Prop. = 1.2). The only situations in which significantly large average values of  $X_{B_2}^2$  occur are for 1,000 precincts with Size = 2000 and Prop. equal to 1.1 or greater, or with Size = 500 and Prop. = 0.8. Since a proportional adjustment that affects all precincts the same way is indistinguishable from a candidate's simply receiving greater or lesser support throughout the electorate, it is perhaps not surprising that the Benford's Law test has little ability to detect such a manipulation.

\*\*\* Table 17 about here \*\*\*

The results in Table 18 show that the Benford's Law test is much more effective when there are proportional increases that occur in the precincts where the candidate is otherwise getting more votes than would be expected based on the uncontaminated process. With 1,000 precincts, the average  $X_{B_2}^2$  values are significantly large in three-quarters of the Above Threshold instances where Prop. is greater than 1. With 500 precincts the average  $X_{B_2}^2$  values are significantly large when Prop. is greater than 1 only for Size = 2000, with one exceptional case occurring for Size = 500 and Prop. = 1.15. The Benford's Law test is mostly not more effective at detecting the proportional adjustment manipulation when it is happening in precincts where the candidate is otherwise receiving fewer votes than would be expected based on the uncontaminated process. There are significantly large average  $X_{B_2}^2$  values in the Below Threshold columns with Size = 500 and Prop. > 1, but for the most part the average  $X_{B_2}^2$  values in the Below Threshold columns are not large.

\*\*\* Table 18 about here \*\*\*

While the Benford's Law test can detect proportional increases in a candidate's support in many situations where only some of the precincts are being affected, it is not very effective at detecting proportional reductions. In Table 18, the average  $X_{B_2}^2$  values for most of the instances where  $\text{Prop.} < 1$  are not large.

## Benford's Law and Voting Machine Vote Counts

Whatever we may conclude about the extent to which the second-digit Benford's Law distribution applies to the precinct-level vote counts from the three Florida counties in 2004, the results in Table 9 and in the other tables show that the Benford's Law distribution in general does not apply to the vote counts on voting machines in these counties. Notwithstanding the evidence from the randomization tests that there is not much support for the idea that the votes cast in each precinct were randomly and independently assigned to the machines used in the precinct, I conjectured that random assignment of votes to machines may explain the non-Benford machine counts. Ignoring for a moment the question of how votes actually were assigned to machines in the counties, I now consider whether a process that does assign the votes randomly and independently does produce second-digit distributions that do not match the second-digit Benford's Law.

First I consider a process that has precincts that contain the same number of voters as were in the Miami-Dade election day precincts, but has votes determined according to mixture processes like those simulated in Table 10. To implement such a process in **R**, I create a matrix, `precinct.data`, that has two rows and as many columns as there are election day precincts. The first row contains the number of votes cast on election day in each precinct, and the second row contains the number of voting machines used on election day to record votes for that precinct.<sup>13</sup> The **R** function that uses the `precinct.data` matrix to simulate randomly assigning votes to machines is defined as follows.

```
pbenfm <- function(lsplit=.1, hsplit=.1, bfrac=1/2) {
  z <- apply(precinct.data, 2,
    function(x){
      p2 <- c(runif(1,0,lsplit),runif(1,(1-hsplit),1));
```

---

<sup>13</sup>The total number of machines referenced in the `precinct.data` matrix corresponds to the number of precinct-machines indicated in Table 1.

```

pf <- c(rbeta(1,1,bfrac),rbeta(1,bfrac,1));
size <- x[1];
partypm <- rpois(2,size*pf/sum(pf));
votes <- sum(rpois(length(partypm), lambda=partypm*p2))
nmachines <- x[2];
mach <- rep(0,nmachines);
# allocate votes at random to the nmachines machines
if (votes > 0) mach <- table(sample(1:nmachines, votes, replace=TRUE));
return( mach )
})

```

The `pbenfm` function does not constrain the total number of votes on each machine to correspond to the number actually recorded on the machine in the original election day data. In `pbenfm`, each vote is equally likely to be counted on each of each precinct's machines.

Running such a simulation with parameters taken from the previously reported simulations sometimes but not always produces a pattern matching what occurs in the actual data.<sup>14</sup> Results are reported in Table 19. For the chosen set of Split values, ranging from 0.1 to 0.7, the second-digit Benford's Law always describes the digits in the simulated precinct vote counts. For Split values larger than 0.4, the digits in the simulated machine counts do not follow the Benford's Law distribution, which matches the pattern in the original data. But for Split = 0.3 or smaller, the machine counts do satisfy Benford's Law. Random assignment of votes to machines does not necessarily annihilate the Benford's Law pattern.

\*\*\* Table 19 about here \*\*\*

Randomly assigning the votes actually cast on election day in Miami-Dade County comes close to reproducing the Benford's Law test results reported, for precinct-machines, in Table 9. The first row in Table 20 shows what happens if the votes cast for Bush and Kerry are randomly assigned to machines, using the same procedure as in `pbenfm`. That is, in that program, instead of using votes simulated using the statistical mixture process, the results for "actual precincts" in Table 20 use the original vote counts for the respective candidates. So the results for precincts in that row are simply taken from Table 9. For both Bush and Kerry, randomly assigning the votes produces average  $X_{B_2}^2$  values that are only slightly smaller than the ones computed for the original precinct-machine counts. For the vote counts that actually occurred on election day, it seems that the approximation to random assignment to machines that did happen then is a large

<sup>14</sup>Parameters `hsplit` and `bfrac` are left at their default values.

part of the reason the machine vote counts are non-Benford.

\*\*\* Table 20 about here \*\*\*

Randomly assigning vote counts produced by simulations calibrated to mimic the votes actually cast on election day in Miami-Dade County muddies the waters a bit. Such results are reported in the second and third lines in Table 20. To produce those simulations, I used `rgenoud` (Mebane and Sekhon 2005; Sekhon and Mebane 1998) to find values for the parameters of the version of `pbenf` (using the Miami-Dade precinct sizes) that minimize the discrepancy between the second digits of the votes expected for each candidate and the second digits of the actual vote counts. Specifically, I used `meanpbenf` with `size` set equal to the actual Miami-Dade election day precinct sizes to compute expected vote counts, then chose values for the `lsplit` and `hsplit` parameters to minimize a chi-squared statistic in which the distribution of the digits of the expected vote counts produced by `meanpbenf` provides the expected values. Results using this calibration appear in the second line of Table 20.<sup>15</sup> The results in the third line of Table 20 follow upon using a version of the vote simulating function in which four parameters are calibrated. The expected vote function in this case is the following

```
meanpbenfB <-  
  size*(1/(1+lbfrac))*(lsplit/2) + size*(hbfrac/(hbfrac+1))*(1+hsplit)/2
```

With `meanpbenfB` I used `rgenoud` to minimize discrepancies with both the second digits of the counts and the counts themselves.<sup>16</sup> Figure 3, which presents density plots to compare the calibrated simulations to the actual precinct vote counts, suggests the calibrated simulations provide a better fit to the votes for Bush than to the votes for Kerry. In any case, neither the two-parameter calibration nor the four-parameter calibration leads to machine vote counts that consistently deviate from the second-digit Benford's Law distribution.<sup>17</sup>

\*\*\* Figure 3 about here \*\*\*

All told, nearly random assignment of votes to voting machines may explain the non-Benford machine counts so frequently observed in the data from the three counties, but it is not

<sup>15</sup>The calibration values for Bush are `lsplit = 0.1168443`, `hsplit = 0.5699924`. For Kerry the values are `lsplit = 0.1789472`, `hsplit = 0.6468790`.

<sup>16</sup>The calibration values for Bush are `lsplit = 0.1144489`, `hsplit = 0.9947601`, `lbfrac = 3.0359998`, `rbfrac = 2.6032223`. For Kerry the values are `lsplit = 0.4803455`, `hsplit = 0.9807219`, `lbfrac = 0.2774467`, `rbfrac = 2.1231147`.

<sup>17</sup>The calibrated simulation results presented in Table 20 use fixed precinct voter sizes; i.e., they use `partypm <- size*pf/sum(pf)` and `votes <- partypm*p2`.

appropriate to draw from that any wider message about how such randomization may affect Benford's Law tests. It is not clear what may be true in general.

## Discussion

Both the vote randomization test and the second-digit Benford's Law appear potentially useful for detecting election fraud. In both cases a number of issues remain unsettled.

The vote randomization test finds strong evidence that votes were not randomly and independently assigned to the various voting machines in use in precincts on election day in the three Florida counties. The test also suggests that votes were not randomly distributed among comparable machines during the early voting period. The principle question is why do the candidate and amendment option vote shares differ across machines. One innocent possibility is that we have not successfully grouped the machines into comparable sets. Differences in usage times during each day may explain the different vote shares. The measure  $\tau_{jk}$  may not be adequate, or my use of it may not be correct. There is also at least one distinction among voting machines that is not reflected in the tests reported in this paper. Some machines were specially equipped with audio capability to support independent voting by visually impaired voters. Perhaps the voters who used such machines had distinctive preferences. I did not separate out the audio-enabled machines principally because information to identify them all is lacking. I have information that identifies some of the audio-enabled machines in Miami-Dade County, but even for the machines designated as audio-enabled it is not clear from the records I have whether the audio capabilities were operating while the machines were being used.

Three classes of questions remain regarding the Benford's Law tests. First, this paper only suggests the range of mixture processes that might be behaviorally defensible and also tend to produce counts with digits that satisfy Benford's Law. Can processes with more heterogeneity in each precinct work? The simulations I have conducted so far to explore that suggest the situation is complicated. Second, how can we make sense of the fact that the mixture process produces counts that satisfy the second-digit Benford's Law for many but not all combinations of parameters? Third, what parameter values produce counts that closely match the counts that occur in real elections? The small calibration effort I attempted produced a pretty good

approximation to the counts for Bush on election day in Miami-Dade County but did not do as well for the counts for Kerry. Can calibration be elevated to become proper estimation? For instance, is there a rationale for treating the second digits of a set of counts as if they were sufficient statistics?

## Data Note

David Dill supplied ballot and event log files recovered from electronic voting machines in Broward, Miami-Dade and Pasco counties. The files were originally obtained by Martha Mahoney using open records requests funded by the Verified Voting Foundation. The ballot files indicate the choices made for each office by each voter and include labels identifying for each ballot the voting machine and the precinct (for election day ballots) or ballot style (for early voting ballots). The event log files show the time (resolved to the second) at which various transactions occurred on each machine, including the time at which each vote was recorded. It is not possible to match vote choices in the ballot files to voting events in the event log files.

Early voting polling site locations for many of the Miami-Dade machines was taken from a file supplied by Martha Mahoney (file "ev.xls," received by me on August 16, 2005). Of the 670 machines that recorded votes during early voting in Miami-Dade, 88 are not included in that file. Two files supplied by Martha Mahoney also were used to determine which Miami-Dade machines were operating with audio capability enabled. These are the "ev.xls" file and a file "Election.xls" (received by me on August 16, 2005) for the machines used on election day.

The data comprise files for electronic early voting and electronic polling place votes but do not include information about paper absentee votes.

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Table 1: Precinct, Machine and Ballot Statistics

Election Day	Broward	Miami-Dade	Pasco
Precincts	775	757	152
Machines	5,306	5,323	1,338
Precinct-machines	10,614	14,128	2,676
Ballots	431,488	435,902	127,526

Early Voting	Broward	Miami-Dade	Pasco
Sites	20	14	3
Styles	150	100	16
Site-days	110	—	4
Style-site-days	—	4,429	—
Machines	190	726	36
Site-day-machines	380	—	72
S-s-d-machines	—	24,374	—
Ballots	176,743	242,344	29,584

Table 2: Event Transaction Counts and Ballot Counts

	Early Voting			Election Day		
	Excess Ballots	Counts Match	Excess Events	Excess Ballots	Counts Match	Excess Events
Broward	0	190	0	15	5,290	1
Miami-Dade	2	724	0	14	5,309	0
Pasco	0	36	0	0	1,338	0

Note: Entries show the number of voting machines having each described relationship between the number of “Normal ballot cast” or “Super ballot cast” events in the event log files and the number of ballots in the ballot image files.

Table 3: Florida Constitutional Amendments on the Ballot in 2004

		Yes	No
Am. 1	Parental Notification of a Minor's Termination of Pregnancy	4,639,635	2,534,910
Am. 2	Constitutional Amendments Proposed by Initiative	4,574,361	2,109,013
Am. 3	The Medical Liability Claimant's Compensation Amendment	4,583,164	2,622,143
Am. 4	Authorizes Miami-Dade and Broward County Voters to Approve Slot Machines in Parimutuel Facilities	3,631,261	3,512,181
Am. 5	Florida Minimum Wage Amendment	5,198,514	2,097,151
Am. 6	Repeal of High Speed Rail Amendment	4,519,423	2,573,280
Am. 7	Patients' Right to Know About Adverse Medical Incidents	5,849,125	1,358,183
Am. 8	Public Protection from Repeated Medical Malpractice	5,121,841	2,083,864

Note: Yes and No vote counts show statewide results.

Table 4: Miami-Dade Machine Randomization False Discovery Rate Tests

item	Election Day			Early Voting		
	precincts	precinct- machines	rejects	style- site-days	s-s-day- machines	rejects
Bush	734	6,976	1	1,175	7,545	1
Kerry	735	6,991	4	1,180	7,564	0
Martinez	734	6,983	0	1,205	7,690	1
Castor	736	7,001	5	1,224	7,809	2
Am. 1 yes	743	7,034	6	1,302	8,159	0
Am. 1 no	737	7,010	4	1,272	8,039	0
Am. 2 yes	742	7,031	6	1,295	8,144	4
Am. 2 no	737	7,009	1	1,228	7,901	2
Am. 3 yes	740	7,019	8	1,290	8,078	1
Am. 3 no	741	7,027	0	1,290	8,072	0
Am. 4 yes	741	7,026	2	1,313	8,209	0
Am. 4 no	739	7,017	0	1,297	8,136	0
Am. 5 yes	736	6,994	0	1,168	7,587	1
Am. 5 no	727	6,928	0	1,082	7,139	0
Am. 6 yes	742	7,031	1	1,308	8,197	0
Am. 6 no	742	7,031	0	1,271	8,061	0
Am. 7 yes	732	6,983	0	1,144	7,522	0
Am. 7 no	720	6,906	0	1,018	6,906	1
Am. 8 yes	739	7,017	0	1,272	8,043	0
Am. 8 no	735	7,000	0	1,219	7,839	2

Note: Each statistic is based on 50,000 Monte Carlo replications to compute the tail probability estimate  $\hat{g}_{jl}$ .

Table 5: Broward Machine Randomization False Discovery Rate Tests

item	Election Day			Early Voting		
	precincts	precinct- machines	rejects	site-days	site-day- machines	rejects
Bush	764	5,286	1	30	110	0
Kerry	765	5,289	0	30	110	0
Martinez	765	5,289	7	30	110	0
Castor	764	5,286	5	30	110	0
Am. 1 yes	767	5,293	0	30	110	0
Am. 1 no	766	5,290	0	30	110	0
Am. 2 yes	764	5,286	0	30	110	0
Am. 2 no	763	5,283	0	30	110	0
Am. 3 yes	765	5,288	2	30	110	0
Am. 3 no	765	5,288	5	30	110	0
Am. 4 yes	766	5,292	6	30	110	0
Am. 4 no	766	5,292	1	30	110	0
Am. 5 yes	757	5,266	7	30	110	1
Am. 5 no	756	5,263	1	30	110	1
Am. 6 yes	764	5,287	1	30	110	0
Am. 6 no	764	5,287	0	30	110	0
Am. 7 yes	759	5,272	4	30	110	1
Am. 7 no	757	5,266	0	30	110	6
Am. 8 yes	761	5,278	1	30	110	0
Am. 8 no	760	5,275	3	30	110	0

Note: Each statistic is based on either 10,000 or 50,000 Monte Carlo replications to compute the tail probability estimate  $\hat{g}_{jl}$ .

Table 6: Pasco Machine Randomization False Discovery Rate Tests

item	Election Day			Early Voting		
	precincts	precinct- machines	rejects	site-days	site-day- machines	rejects
Bush	152	1,338	2	3	35	0
Kerry	152	1,338	4	3	35	0
Martinez	152	1,338	0	3	35	0
Castor	152	1,338	2	3	35	0
Am. 1 yes	152	1,338	1	3	35	0
Am. 1 no	152	1,338	0	3	35	0
Am. 2 yes	152	1,338	0	3	35	0
Am. 2 no	152	1,338	0	3	35	0
Am. 3 yes	152	1,338	0	3	35	0
Am. 3 no	152	1,338	0	3	35	0
Am. 4 yes	152	1,338	0	3	35	0
Am. 4 no	152	1,338	0	3	35	0
Am. 5 yes	152	1,338	0	3	35	1
Am. 5 no	152	1,338	0	3	35	0
Am. 6 yes	152	1,338	0	3	35	0
Am. 6 no	152	1,338	0	3	35	0
Am. 7 yes	152	1,338	0	3	35	0
Am. 7 no	152	1,338	1	3	35	1
Am. 8 yes	152	1,338	0	3	35	0
Am. 8 no	152	1,338	0	3	35	0

Note: Each statistic is based on 10,000 Monte Carlo replications to compute the tail probability estimate  $\hat{g}_{jl}$ .

Table 7: Frequency of Digits according to Benford's Law

digit	0	1	2	3	4	5	6	7	8	9
first	—	.301	.176	.124	.097	.079	.067	.058	.051	.046
second	.120	.114	.109	.104	.100	.097	.093	.090	.088	.085

Table 8: Miami-Dade Election Day First-digit Benford's Law Tests

item	Benf.	equal	item	Benf.	equal
Bush	29.3	292.5	Am. 4 Yes	144.8	367.0
Kerry	39.9	287.0	Am. 4 No	119.6	605.6
Martinez	35.6	273.8	Am. 5 Yes	115.4	122.2
Castor	22.0	304.7	Am. 5 No	27.6	623.4
Am. 1 Yes	86.2	290.5	Am. 6 Yes	98.8	395.0
Am. 1 No	80.5	636.2	Am. 6 No	84.0	532.9
Am. 2 Yes	95.6	362.5	Am. 7 Yes	130.3	112.7
Am. 2 No	60.0	722.7	Am. 7 No	49.9	582.8
Am. 3 Yes	60.5	401.3	Am. 8 Yes	123.0	210.6
Am. 3 No	51.5	496.5	Am. 8 No	102.6	831.1

Note:  $n = 757$  precincts. Each statistic is the Pearson chi-squared statistic, with eight degrees of freedom.

Table 9: Miami-Dade Election Day Second-digit Benford's Law Tests

item	precincts ( <i>n</i> = 757)		machines ( <i>n</i> = 5,326)		precinct- machines ( <i>n</i> = 7,064)	
	Benf.	equal	Benf.	equal	Benf.	equal
Bush	7.9	10.8	28.0	20.5	17.2	39.5
Kerry	9.5	14.4	61.8	10.0	44.0	13.1
Martinez	8.9	10.8	33.4	11.9	11.5	29.2
Castor	12.0	12.8	44.5	15.6	12.7	43.5
Am. 1 Yes	2.5	8.0	72.4	10.3	43.6	12.6
Am. 1 No	5.5	15.5	73.9	9.2	19.8	31.9
Am. 2 Yes	16.7	23.6	68.5	3.5	38.7	27.3
Am. 2 No	7.2	16.4	49.5	17.3	11.9	48.8
Am. 3 Yes	3.3	8.5	98.4	9.2	78.0	5.5
Am. 3 No	12.9	12.7	76.9	9.0	25.7	26.8
Am. 4 Yes	3.3	9.0	49.1	5.8	43.5	14.4
Am. 4 No	5.7	15.4	89.5	5.4	25.4	15.3
Am. 5 Yes	17.9	19.6	81.4	3.9	57.6	2.9
Am. 5 No	5.8	23.3	5.9	56.8	25.6	135.6
Am. 6 Yes	4.3	10.2	50.3	5.8	29.7	16.3
Am. 6 No	9.1	11.3	47.3	6.5	15.3	30.8
Am. 7 Yes	17.1	16.0	51.7	21.0	53.2	21.1
Am. 7 No	8.4	16.5	78.9	220.0	136.7	318.7
Am. 8 Yes	12.7	25.3	69.6	1.5	54.2	8.3
Am. 8 No	6.5	10.6	67.8	13.9	23.2	29.1

Note: Each statistic is the Pearson chi-squared statistic, with nine degrees of freedom.

Table 10: Second-digit Benford's Law Tests with Simulated Vote Counts

Size	Split	Mean Votes	500 precincts		750 precincts		1,000 precincts	
			Benf.	equal	Benf.	equal	Benf.	equal
250	0.1	54.2	14.6	31.9	17.8	43.7	20.0	54.0
	0.2	62.5	13.9	30.8	17.9	43.2	19.8	52.3
	0.3	70.8	14.8	32.1	17.9	42.5	20.7	54.0
	0.4	79.2	16.0	33.0	19.6	46.0	21.5	56.1
	0.5	87.5	17.4	34.3	20.0	44.7	23.8	56.4
	0.6	95.8	13.5	24.7	14.8	29.3	17.6	36.9
500	0.1	108.3	9.4	12.4	9.8	14.9	10.0	16.4
	0.2	125.0	9.2	15.2	8.9	15.8	8.8	18.4
	0.3	141.7	10.3	13.2	10.0	13.7	10.9	17.4
	0.4	158.3	10.8	10.1	11.4	10.6	12.2	12.2
	0.5	175.0	11.1	10.5	11.0	10.7	13.1	11.8
	0.6	191.7	12.3	10.5	13.1	9.8	14.4	10.1
750	0.1	162.5	10.3	11.0	10.8	11.6	11.0	12.0
	0.2	187.5	9.6	11.3	10.2	12.1	12.4	14.2
	0.3	212.5	11.8	9.9	11.4	10.1	14.3	10.4
	0.4	237.5	12.4	9.2	12.7	9.4	15.5	9.4
	0.5	262.5	12.2	8.6	14.7	9.3	17.2	9.5
	0.6	287.5	13.1	9.3	14.2	9.1	17.0	9.3
1000	0.1	216.7	10.4	11.4	10.6	11.9	12.8	13.0
	0.2	250.0	12.3	9.8	12.9	9.6	14.7	10.7
	0.3	283.3	12.2	9.7	15.5	9.6	17.1	9.4
	0.4	316.7	13.2	8.9	15.2	9.4	16.6	8.9
	0.5	350.0	13.4	8.6	16.4	8.4	18.9	9.4
	0.6	383.3	13.5	9.5	15.3	8.5	17.5	9.1
1250	0.1	270.8	9.8	15.7	10.5	18.2	10.1	23.1
	0.2	312.5	9.1	12.3	10.5	13.9	10.9	17.1
	0.3	354.2	10.1	11.3	11.2	14.3	12.0	16.1
	0.4	395.8	11.2	13.2	12.2	15.2	13.1	16.5
	0.5	437.5	11.6	14.4	12.7	18.1	14.1	19.2
	0.6	479.2	11.6	15.9	13.5	20.8	14.9	22.0
1500	0.1	325	9.7	17.0	8.9	19.8	9.8	25.7
	0.2	375	9.1	16.1	9.9	19.1	9.9	23.0
	0.3	425	9.3	16.9	10.0	21.4	10.7	26.5
	0.4	475	11.2	22.1	11.0	25.3	12.1	31.4
	0.5	525	14.7	29.9	18.6	42.6	21.0	52.0
	0.6	575	27.2	52.7	33.9	70.3	43.7	93.2

Note: Each statistic is the Pearson chi-squared statistic, with nine degrees of freedom, averaged over 100 Monte Carlo replications.

Table 11: Second-digit Benford's Law Tests with Simulated Vote Counts

Size	Split	Mean Votes	500 precincts		750 precincts		1,000 precincts	
			Benf.	equal	Benf.	equal	Benf.	equal
1750	0.1	379.2	9.2	18.0	9.7	23.6	10.2	28.1
	0.2	437.5	9.8	19.7	11.1	27.5	11.3	33.8
	0.3	495.8	12.8	28.1	14.8	38.1	15.6	44.1
	0.4	554.2	16.2	35.5	20.6	50.9	26.0	66.0
	0.5	612.5	27.0	54.6	35.9	77.3	41.0	94.1
	0.6	670.8	41.2	76.9	55.4	107.2	75.8	148.0
2000	0.1	433.3	10.3	21.1	11.3	28.0	12.2	34.9
	0.2	500.0	12.2	26.6	15.7	38.7	17.9	48.4
	0.3	566.7	15.0	33.8	20.5	50.2	24.3	63.9
	0.4	633.3	20.5	43.6	25.2	58.6	30.4	75.0
	0.5	700.0	26.3	53.1	34.9	74.7	45.2	99.8
	0.6	766.7	35.2	64.7	48.2	91.9	63.1	121.8
2250	0.1	487.5	14.9	31.8	17.3	43.2	23.0	60.0
	0.2	562.5	17.1	36.4	19.1	47.6	23.3	61.5
	0.3	637.5	17.9	39.1	21.4	51.5	27.2	68.8
	0.4	712.5	19.8	41.7	26.6	60.2	28.9	71.0
	0.5	787.5	23.5	47.5	31.0	67.5	42.8	93.1
	0.6	862.5	23.4	41.3	29.6	55.9	36.2	72.9
2500	0.1	541.7	17.4	37.0	20.0	48.3	25.9	64.1
	0.2	625.0	17.4	36.7	20.4	47.4	24.9	62.5
	0.3	708.3	17.2	35.2	20.5	47.4	28.2	66.3
	0.4	791.7	17.4	35.9	22.6	50.6	26.7	63.7
	0.5	875.0	18.7	36.6	23.9	50.5	28.8	64.5
	0.6	958.3	14.6	24.0	17.5	31.0	20.5	39.0
2750	0.1	595.8	14.9	30.7	18.4	41.5	21.4	50.8
	0.2	687.5	15.6	28.8	19.3	40.5	22.6	50.2
	0.3	779.2	16.3	30.2	18.3	37.4	21.2	47.3
	0.4	870.8	13.7	27.7	16.4	36.2	19.3	47.6
	0.5	962.5	12.6	21.4	15.9	30.6	19.5	38.7
	0.6	1054.2	11.0	14.8	12.3	18.7	13.9	21.1
3000	0.1	650	13.5	23.3	14.7	29.7	16.4	36.1
	0.2	750	12.2	19.7	14.6	27.5	16.2	32.4
	0.3	850	11.8	18.0	12.2	21.9	15.1	26.6
	0.4	950	10.6	19.5	11.4	23.9	11.4	29.1
	0.5	1050	12.0	17.0	11.4	18.6	11.6	21.0
	0.6	1150	11.1	12.6	11.5	13.4	11.7	16.0

Note: Each statistic is the Pearson chi-squared statistic, with nine degrees of freedom, averaged over 100 Monte Carlo replications.

Table 12: Miami-Dade Early Voting Second-digit Benford's Law Tests

item	site- style-days ( <i>n</i> = 5,186)		machines ( <i>n</i> = 727)		site-style- day-machines ( <i>n</i> = 33,126)	
	Benf.	equal	Benf.	equal	Benf.	equal
Bush	10.1	44.9	23.5	20.9	130.3	391.4
Kerry	17.3	60.4	61.7	12.1	115.5	387.3
Martinez	14.8	48.6	32.6	17.3	107.6	357.9
Castor	9.1	42.1	43.3	18.6	93.0	336.2
Am. 1 Yes	14.1	59.9	69.6	9.8	119.7	415.4
Am. 1 No	8.7	44.1	64.8	9.8	86.3	295.7
Am. 2 Yes	17.7	65.4	58.3	2.6	83.4	334.7
Am. 2 No	20.2	71.1	41.9	16.9	92.0	292.8
Am. 3 Yes	8.2	41.4	90.8	7.6	122.7	394.8
Am. 3 No	15.3	56.7	66.1	7.8	104.8	342.1
Am. 4 Yes	7.7	40.6	47.1	11.0	87.3	338.0
Am. 4 No	14.4	60.7	83.6	5.3	108.9	351.4
Am. 5 Yes	21.9	78.3	69.2	4.6	58.4	307.5
Am. 5 No	11.0	44.8	5.7	71.6	84.4	237.8
Am. 6 Yes	12.9	56.9	55.3	11.0	105.2	368.5
Am. 6 No	9.0	37.8	44.4	9.6	126.6	374.1
Am. 7 Yes	24.6	85.0	47.8	14.9	134.2	468.3
Am. 7 No	12.0	33.9	77.4	236.4	64.5	192.7
Am. 8 Yes	13.9	61.7	68.9	2.4	96.3	377.7
Am. 8 No	6.7	28.9	63.5	15.5	79.2	261.2

Note: Each statistic is the Pearson chi-squared statistic, with nine degrees of freedom.

Table 13: Broward Second-digit Benford's Law Tests

item	Election Day				Early Voting			
	precincts ( <i>n</i> = 775)		machines ( <i>n</i> = 5,307)		styles ( <i>n</i> = 150)		machines ( <i>n</i> = 190)	
	Benf.	equal	Benf.	equal	Benf.	equal	Benf.	equal
Bush	9.6	6.6	23.4	25.6	9.1	12.2	8.4	9.5
Kerry	21.2	12.4	79.7	6.5	21.4	24.8	10.5	17.6
Martinez	10.7	8.3	28.2	20.1	6.6	9.8	5.2	8.6
Castor	13.6	5.9	69.7	11.4	9.2	6.7	11.4	17.5
Am. 1 Yes	24.1	16.3	31.2	8.5	10.1	12.2	14.9	10.0
Am. 1 No	17.1	18.1	60.3	8.4	7.0	3.7	7.0	7.2
Am. 2 Yes	12.2	7.3	47.5	21.7	13.6	11.7	19.4	16.8
Am. 2 No	11.6	22.4	47.6	18.8	8.7	9.8	4.8	3.9
Am. 3 Yes	7.4	6.4	65.8	9.1	8.1	11.8	11.0	14.9
Am. 3 No	24.9	6.7	40.5	11.7	11.9	17.7	5.4	4.6
Am. 4 Yes	9.8	7.7	61.3	5.8	14.4	15.5	14.2	22.7
Am. 4 No	8.6	16.2	55.8	10.1	4.7	10.1	10.5	8.2
Am. 5 Yes	7.9	8.8	76.9	17.5	13.8	13.0	15.6	20.9
Am. 5 No	7.4	20.6	24.8	113.4	5.2	4.1	9.7	8.4
Am. 6 Yes	19.4	9.9	84.9	10.3	4.4	4.4	11.9	16.8
Am. 6 No	6.2	10.9	43.7	5.6	7.8	10.1	16.6	16.4
Am. 7 Yes	13.1	16.7	72.1	6.6	5.0	8.6	44.0	64.2
Am. 7 No	14.3	44.3	157.7	346.9	8.9	9.6	5.7	8.7
Am. 8 Yes	7.1	3.8	74.6	6.3	4.3	6.2	27.9	42.9
Am. 8 No	13.9	26.1	15.9	21.7	6.7	7.3	4.0	7.7

Note: Each statistic is the Pearson chi-squared statistic, with nine degrees of freedom. In Broward, on election day each machine recorded votes for only one precinct. In the early voting data the number of votes on each style-machine combination was too small (mean = 16.7, median = 2) to support analysis for those combinations.

Table 14: Pasco Second-digit Benford's Law Tests

item	Election Day				Early Voting	
	precincts ( <i>n</i> = 152)		machines ( <i>n</i> = 1,338)		machine- precincts ( <i>n</i> = 372)	
	Benf.	equal	Benf.	equal	Benf.	equal
Bush	6.9	5.6	16.4	16.2	14.6	23.8
Kerry	4.0	3.5	22.9	21.7	19.0	25.2
Martinez	6.5	3.7	30.6	6.4	13.4	24.3
Castor	11.2	10.5	40.5	7.7	14.7	20.7
Am. 1 Yes	9.0	10.4	24.1	11.3	5.4	10.5
Am. 1 No	7.0	5.1	9.8	5.0	18.6	28.3
Am. 2 Yes	5.4	4.8	28.6	10.3	9.6	16.2
Am. 2 No	8.6	12.7	15.8	1.9	10.4	17.7
Am. 3 Yes	10.4	9.3	34.6	11.0	12.5	18.6
Am. 3 No	8.5	4.4	10.1	16.2	13.1	19.2
Am. 4 Yes	6.0	8.4	20.7	2.8	8.6	14.7
Am. 4 No	8.6	5.2	19.8	9.3	21.5	33.4
Am. 5 Yes	3.6	9.4	16.6	8.2	11.9	20.9
Am. 5 No	3.8	6.4	10.2	19.1	10.3	17.2
Am. 6 Yes	12.8	15.5	33.5	7.7	10.5	18.7
Am. 6 No	4.4	4.7	20.1	10.0	14.4	16.4
Am. 7 Yes	29.5	43.3	20.5	18.3	14.1	22.3
Am. 7 No	5.1	7.2	19.9	10.7	5.2	6.9
Am. 8 Yes	8.0	13.8	16.5	7.7	6.3	8.6
Am. 8 No	8.0	14.6	29.9	6.6	11.1	18.1

Note: Each statistic is the Pearson chi-squared statistic, with nine degrees of freedom. In Pasco, on election day each machine recorded votes for only one precinct. In Pasco there were only 16 early voting "precincts," too few to support analysis for those units.

Table 15: Simulated Repeaters

Size	Add	500 precincts		1,000 precincts	
		Benf.	equal	Benf.	equal
500	0.05	9.1	12.0	8.7	12.3
	0.10	8.8	13.7	9.9	19.0
	0.15	9.2	18.0	9.9	28.0
	0.20	14.5	17.8	19.5	21.6
	0.25	29.6	16.2	43.4	18.9
1000	0.05	11.4	12.6	10.7	13.3
	0.10	11.5	7.9	16.7	10.3
	0.15	15.2	11.6	18.7	12.1
	0.20	12.3	10.9	13.3	11.4
	0.25	12.5	14.8	16.5	18.3
1500	0.05	9.7	17.8	10.6	24.7
	0.10	7.8	15.7	11.4	28.2
	0.15	9.8	21.2	13.4	35.7
	0.20	18.1	39.1	25.4	66.0
	0.25	26.4	54.0	52.7	111.9
2000	0.05	12.6	26.2	23.0	57.2
	0.10	18.3	39.4	31.0	74.8
	0.15	22.0	44.1	29.5	70.9
	0.20	21.2	41.8	31.8	71.1
	0.25	20.2	35.8	33.3	68.7

Note: Each statistic is the Pearson chi-squared statistic, with nine degrees of freedom, averaged over 25 Monte Carlo replications. Split = .1. For each size, the mean number of votes for the candidate before the repeaters are added is: 500, 108.3; 1000, 216.7; 1500, 325; 2000, 433.3.

Table 16: Simulated Repeaters with Thresholds

Size	Add	500 precincts				1,000 precincts			
		Below Threshold		Above Threshold		Below Threshold		Above Threshold	
		Benf.	equal	Benf.	equal	Benf.	equal	Benf.	equal
500	0.05	13.2	24.3	19.4	13.0	19.5	43.2	25.8	16.1
	0.10	17.5	30.5	18.9	13.4	25.9	53.5	34.4	22.3
	0.15	17.5	27.7	16.3	18.7	29.5	50.5	24.0	27.7
	0.20	14.6	15.3	8.6	12.3	18.9	20.1	9.5	17.5
	0.25	15.5	11.6	16.7	12.2	24.2	15.9	23.0	14.0
1000	0.05	12.8	15.3	13.0	11.5	18.1	22.3	17.6	16.3
	0.10	13.1	7.3	10.5	11.3	18.6	9.0	11.9	18.1
	0.15	12.3	8.4	13.8	15.1	19.6	9.6	20.0	26.5
	0.20	15.1	8.4	10.3	16.4	22.3	10.4	13.5	28.2
	0.25	15.2	10.5	15.2	21.8	19.7	12.8	21.9	36.4
1500	0.05	9.3	11.4	11.9	26.8	10.5	14.1	13.5	38.9
	0.10	11.0	12.6	11.0	25.6	10.7	13.2	16.3	44.0
	0.15	7.6	11.4	13.8	31.1	11.3	17.4	20.0	54.6
	0.20	9.4	13.3	22.4	47.7	8.4	16.6	42.6	96.2
	0.25	10.3	12.3	41.8	77.8	10.3	15.7	72.6	142.9
2000	0.05	9.5	19.0	15.8	34.7	10.8	26.6	24.3	60.8
	0.10	8.1	14.6	21.5	46.0	10.9	29.1	29.6	74.4
	0.15	8.8	17.6	24.5	48.2	11.7	29.4	38.4	87.1
	0.20	7.9	14.8	21.9	42.9	9.5	26.4	42.3	88.0
	0.25	11.4	20.9	23.1	42.4	10.3	25.5	38.7	75.9

Note: Each statistic is the Pearson chi-squared statistic, with nine degrees of freedom, averaged over 25 Monte Carlo replications. Split = .1. For each size, the mean number of votes for the candidate before the repeaters are added is: 500, 108.3; 1000, 216.7; 1500, 325; 2000, 433.3.

Table 17: Simulated Proportional Adjustments

Size	Prop.	500 precincts		1,000 precincts	
		Benf.	equal	Benf.	equal
500	0.8	12.9	18.0	18.0	29.5
	0.85	10.7	14.4	9.3	18.2
	0.9	7.7	13.0	7.7	16.0
	0.95	9.4	11.4	8.6	13.0
	1.05	10.4	11.1	10.1	14.8
	1.1	9.6	14.8	10.2	15.4
	1.15	9.7	10.3	13.7	13.2
	1.2	11.3	14.4	13.2	16.5
1000	0.8	16.2	18.0	15.6	19.6
	0.85	10.3	10.0	12.7	11.8
	0.9	10.9	10.7	11.3	10.1
	0.95	10.7	12.1	11.4	11.9
	1.05	9.9	10.6	10.9	11.7
	1.1	10.3	14.2	10.4	19.2
	1.15	11.0	14.6	10.6	15.2
	1.2	9.9	15.2	10.0	19.4
1500	0.8	10.5	15.0	13.7	27.7
	0.85	10.0	15.7	10.0	23.2
	0.9	9.5	17.0	10.0	24.1
	0.95	10.1	17.7	10.1	24.9
	1.05	9.2	16.9	8.1	23.1
	1.1	9.6	18.4	9.5	27.0
	1.15	10.6	19.5	9.1	25.6
	1.2	10.1	20.6	10.2	28.8
2000	0.8	10.5	20.5	11.1	29.7
	0.85	8.6	16.3	9.6	27.4
	0.9	9.5	20.0	12.3	31.2
	0.95	8.4	17.8	10.3	30.4
	1.05	12.9	26.8	16.0	45.2
	1.1	15.5	33.1	23.2	59.8
	1.15	16.8	34.3	27.3	69.2
	1.2	18.3	39.5	23.5	61.8

Note: Each statistic is the Pearson chi-squared statistic, with nine degrees of freedom, averaged over 25 Monte Carlo replications. Split = .1. For each size, the mean number of votes for the candidate before the repeaters are added is: 500, 108.3; 1000, 216.7; 1500, 325; 2000, 433.3.

Table 18: Simulated Proportional Adjustments with Thresholds

Size	Prop.	500 precincts				1,000 precincts			
		Below Threshold		Above Threshold		Below Threshold		Above Threshold	
		Benf.	equal	Benf.	equal	Benf.	equal	Benf.	equal
500	0.8	17.9	18.3	10.1	14.4	23.6	24.4	12.3	22.3
	0.85	10.7	10.4	7.1	11.5	11.3	10.6	8.4	16.8
	0.9	10.9	9.8	9.5	15.1	12.0	10.3	9.5	21.0
	0.95	12.5	10.2	11.3	15.4	17.3	13.5	10.5	19.0
	1.05	15.3	20.8	14.2	12.5	21.4	30.8	22.5	18.1
	1.1	22.3	33.0	15.5	11.6	33.7	53.8	26.0	18.3
	1.15	17.9	26.2	17.8	12.2	22.1	36.3	23.5	13.4
	1.2	21.5	31.1	16.6	10.7	33.6	52.0	26.5	15.4
1000	0.8	17.2	23.3	14.3	10.1	23.3	34.2	22.6	13.8
	0.85	11.9	14.1	11.5	9.5	16.0	22.2	17.9	11.9
	0.9	10.4	10.7	9.4	10.5	10.8	12.1	11.8	10.0
	0.95	9.1	9.7	10.3	9.8	10.9	12.0	13.0	11.3
	1.05	11.2	17.4	14.0	8.3	16.5	28.5	21.4	11.2
	1.1	14.5	23.1	11.9	8.4	19.1	35.9	20.7	12.4
	1.15	12.1	17.8	13.4	10.6	14.7	25.2	17.5	12.6
	1.2	14.0	21.8	11.7	10.9	17.2	29.3	17.4	14.4
1500	0.8	13.9	20.8	12.4	12.7	17.9	30.7	19.4	17.2
	0.85	11.3	15.6	11.9	14.1	12.9	20.5	14.9	20.7
	0.9	10.3	12.5	11.6	17.3	10.2	12.5	11.5	21.4
	0.95	10.0	10.9	8.7	13.2	11.4	15.2	11.6	22.2
	1.05	8.9	11.8	9.6	14.3	10.2	17.7	9.0	19.3
	1.1	9.8	13.2	8.3	14.3	11.6	18.2	11.9	24.6
	1.15	10.2	10.3	10.9	18.8	13.0	13.9	12.5	30.7
	1.2	10.8	11.2	12.8	22.9	14.3	12.1	15.4	36.6
2000	0.8	11.0	13.8	11.2	17.0	14.9	21.2	10.7	22.1
	0.85	11.3	13.2	10.4	19.1	11.7	14.5	12.4	25.4
	0.9	11.0	10.1	13.6	24.9	12.6	10.8	15.4	34.9
	0.95	12.2	9.8	10.7	20.3	11.4	10.6	13.4	32.7
	1.05	11.1	11.4	16.5	30.3	9.8	11.9	25.0	51.9
	1.1	10.3	11.1	21.4	39.1	9.5	11.2	34.6	68.6
	1.15	12.3	10.2	25.3	46.4	15.3	10.5	50.0	95.2
	1.2	12.4	12.8	23.2	42.7	8.7	9.2	38.2	76.9

Note: Each statistic is the Pearson chi-squared statistic, with nine degrees of freedom, averaged over 25 Monte Carlo replications. Split = .1. For each size, the mean number of votes for the candidate before the repeaters are added is: 500, 108.3; 1000, 216.7; 1500, 325; 2000, 433.3.

Table 19: Simulated Counts for Miami-Dade Precincts and Machines

Split	precincts		machines	
	Benf.	equal	Benf.	equal
0.1	9.5	14.5	9.5	69.5
0.2	9.4	14.3	10.3	61.0
0.3	9.6	15.9	12.6	45.2
0.4	9.1	13.5	16.8	35.1
0.5	8.8	12.6	21.8	26.6
0.6	11.1	12.3	29.2	25.0
0.7	9.4	13.1	33.0	18.9

Note: Each statistic is the Pearson chi-squared statistic, with nine degrees of freedom, averaged over 25 Monte Carlo replications.

Table 20: Calibrated Simulated Counts for Miami-Dade Precincts and Machines

Calibrated Parameters	Bush				Kerry			
	precincts		machines		precincts		machines	
	Benf.	equal	Benf.	equal	Benf.	equal	Benf.	equal
actual precincts	7.9	10.8	16.3	35.7	9.5	14.4	36.7	19.1
splits	10.4	18.2	19.4	109.3	9.2	18.6	16.0	103.0
splits and betas	9.8	15.2	11.1	48.6	9.4	14.8	12.2	49.1

Note: Each statistic is the Pearson chi-squared statistic, with nine degrees of freedom. The simulated statistics are averaged over 100 Monte Carlo replications.

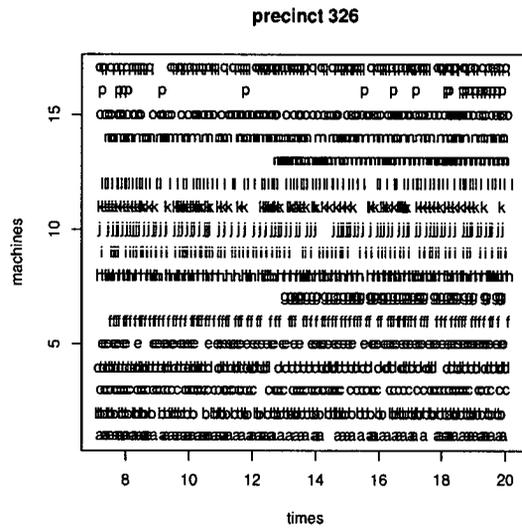
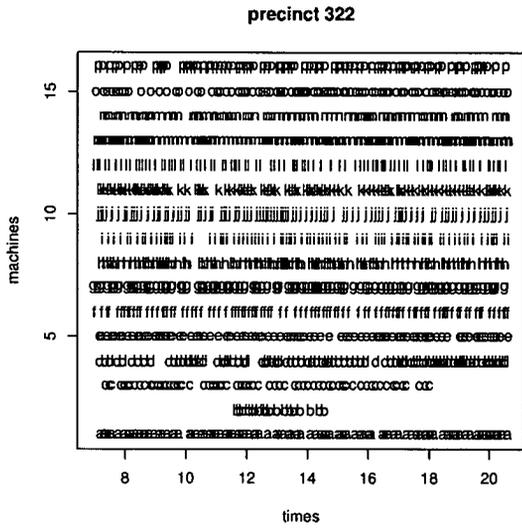
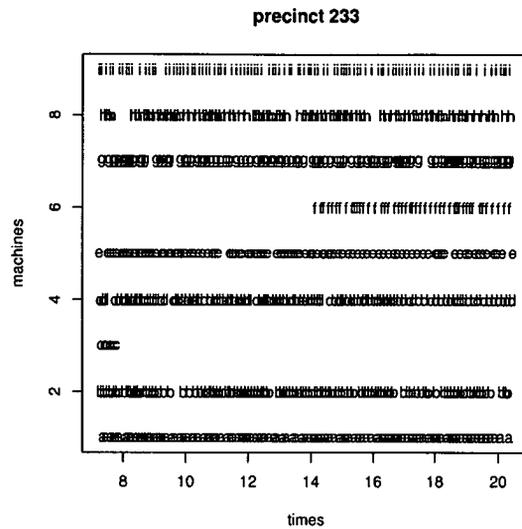
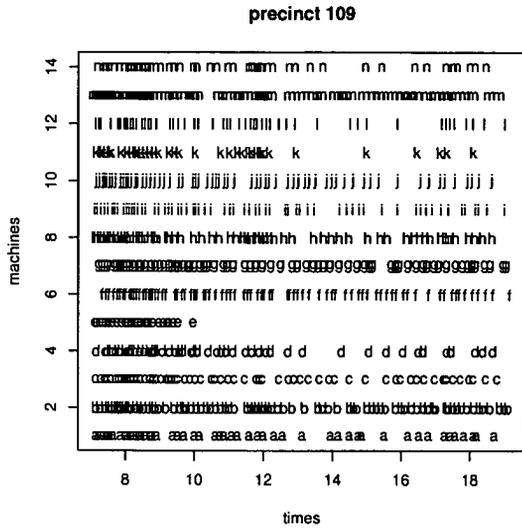


Figure 1: Times (Resolved to the Second and Shown on a 24-Hour Clock) When Votes Were Cast on Machines in Selected Precincts on Election Day, Miami-Dade County

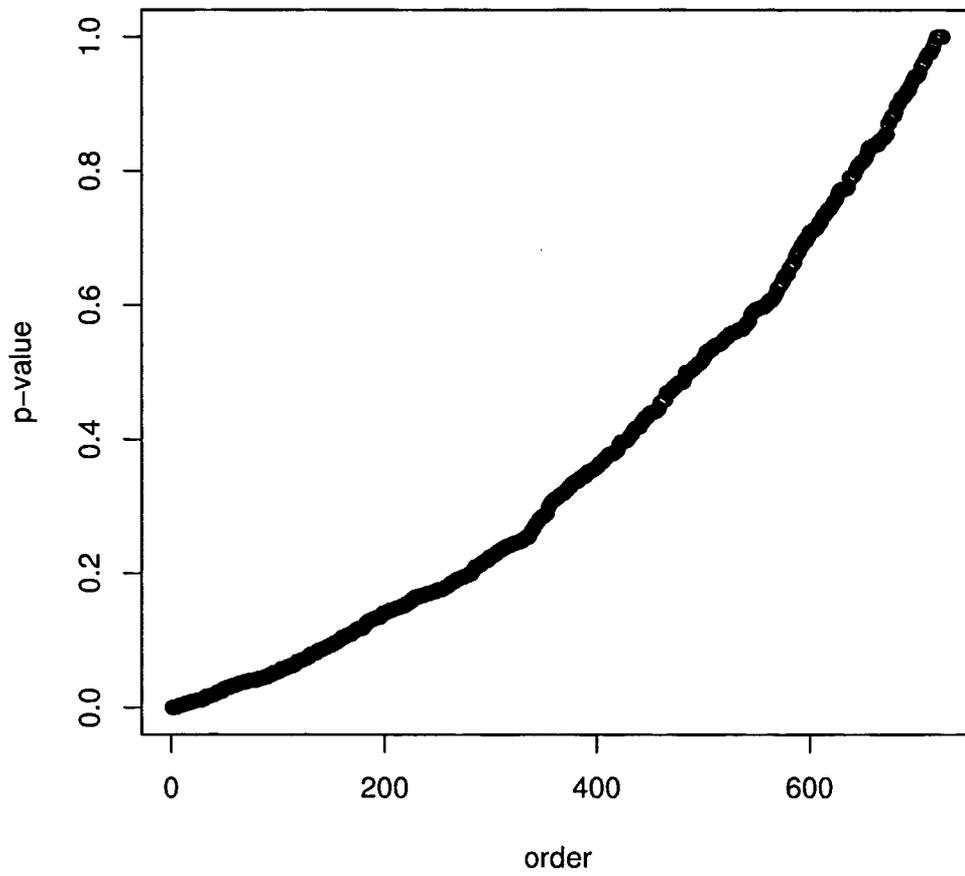


Figure 2: Miami-Dade Election Day Voting Machine Randomization Test Tail Probabilities

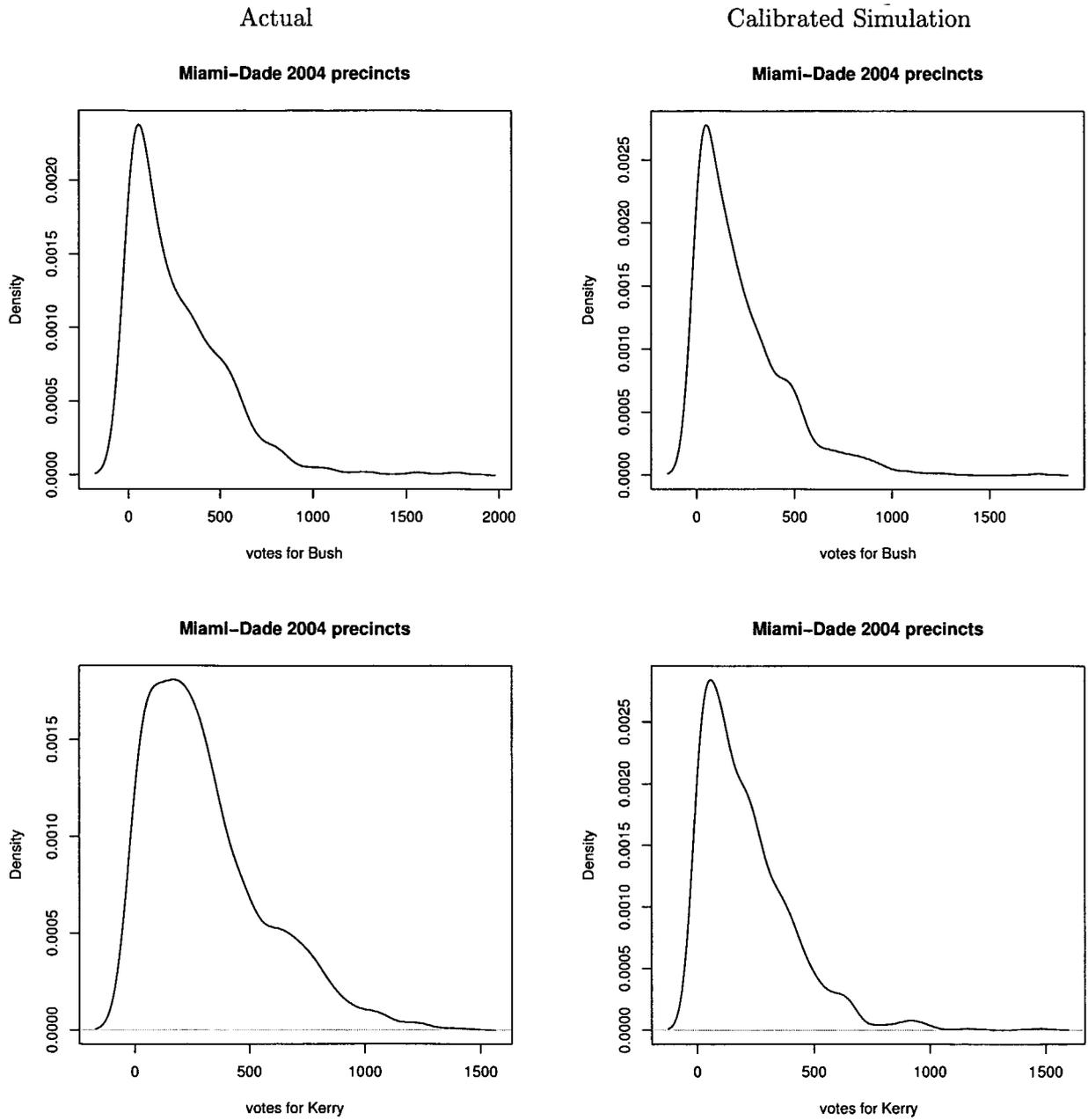


Figure 3: Miami-Dade Election Day Precinct Vote Count Distributions



# Department of Justice

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## **Justice Department Sends Election Observers to 22 States Across the Country in Unprecedented Monitoring Effort for a Midterm Election**

WASHINGTON – The Justice Department today announced that it is deploying an unprecedented number of federal personnel to monitor tomorrow's midterm election, sending more than 500 federal observers and more than 350 Justice Department personnel to 69 jurisdictions in 22 states – more than double the total sent on election day in 2002, which was the previous record for a midterm election.

Since the passage of the Voting Rights Act of 1965, the Justice Department has regularly sent observers and monitors around the country to protect election-related civil rights. This summer, President Bush signed the reauthorized Voting Rights Act, which protects the rights of Americans to participate in the electoral process without discrimination. Under the law, the Department of Justice is authorized to ask the Office of Personnel Management (OPM) to send federal observers to areas that have been certified for coverage by a federal court, or the Attorney General, pursuant to the Act. Federal OPM observers and/or Justice Department personnel will monitor polling place activities in 69 jurisdictions in 22 states throughout the country:

- Chambers County, Ala.
- Lee County, Ala.
- Tuscaloosa County, Ala.
- Apache County, Ariz.
- Cochise County, Ariz.
- Maricopa County, Ariz.
- Navajo County, Ariz.
- Pima County, Ariz.
- Pulaski County, Ark.
- Alameda County, Calif.
- Orange County, Calif.
- San Benito County, Calif.
- San Diego County, Calif.
- San Francisco, Calif.
- San Mateo County, Calif.

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