BROOKINGS INDIA

QUALITY, INDEPENDENCE, IMPACT

The Impact of Electronic Voting Machines on Electoral Frauds, Democracy, and Development

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- We study the effects of Electronic Voting Machines in India.

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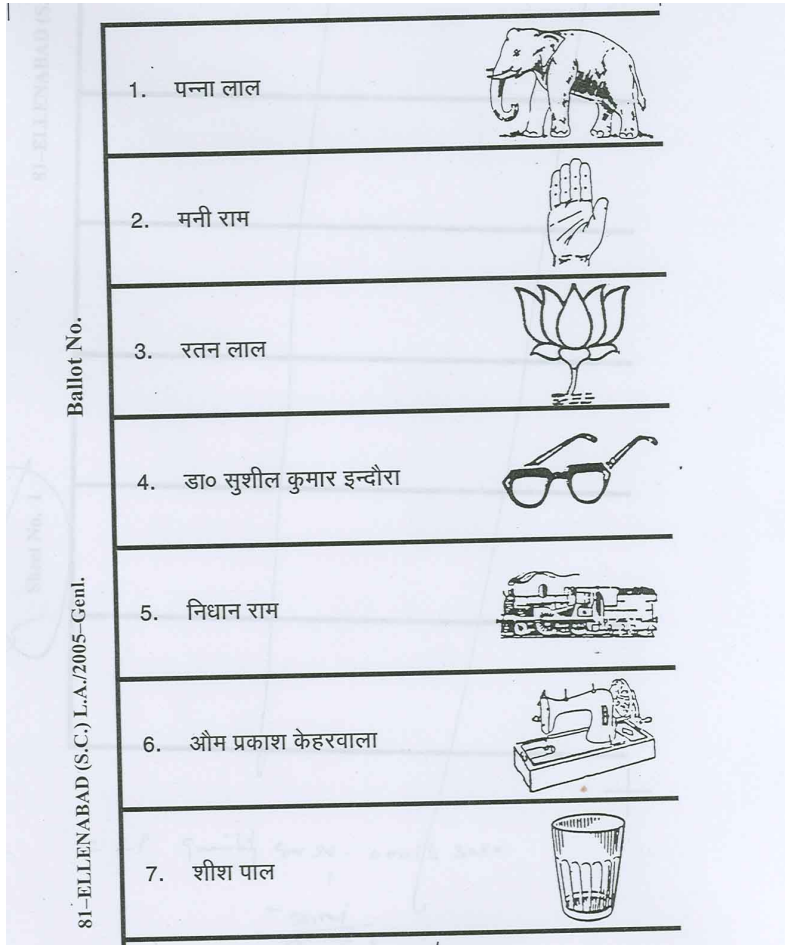
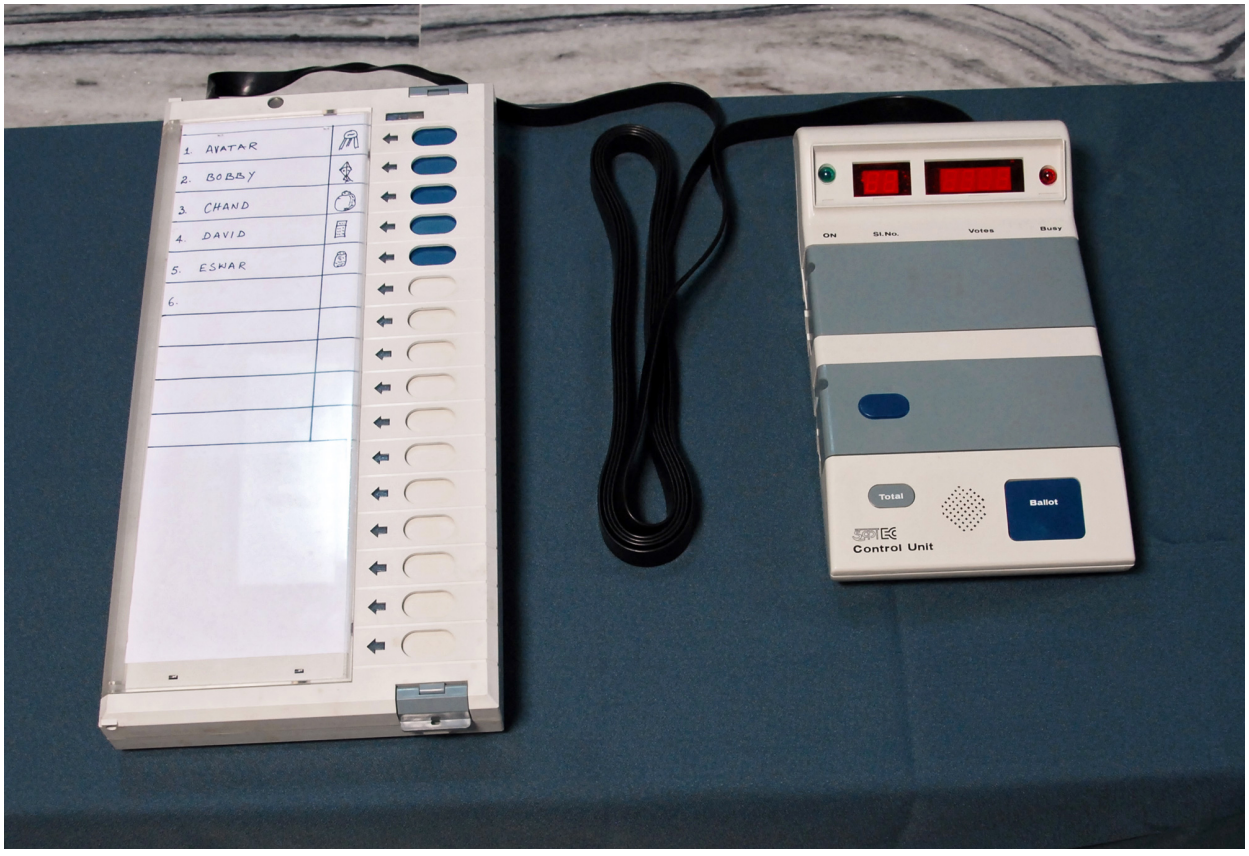


Electronic Voting Machines



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- Voter presses the key against the candidate of his choice in the polling cubicle.
- A red lamp on the ballot unit indicates the voter that his vote has been cast.
- A beep in the Control Unit indicates to the Presiding Officer that a vote has been cast.

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- Elections with EVMs exhibit 10 percent additional supply of electricity.

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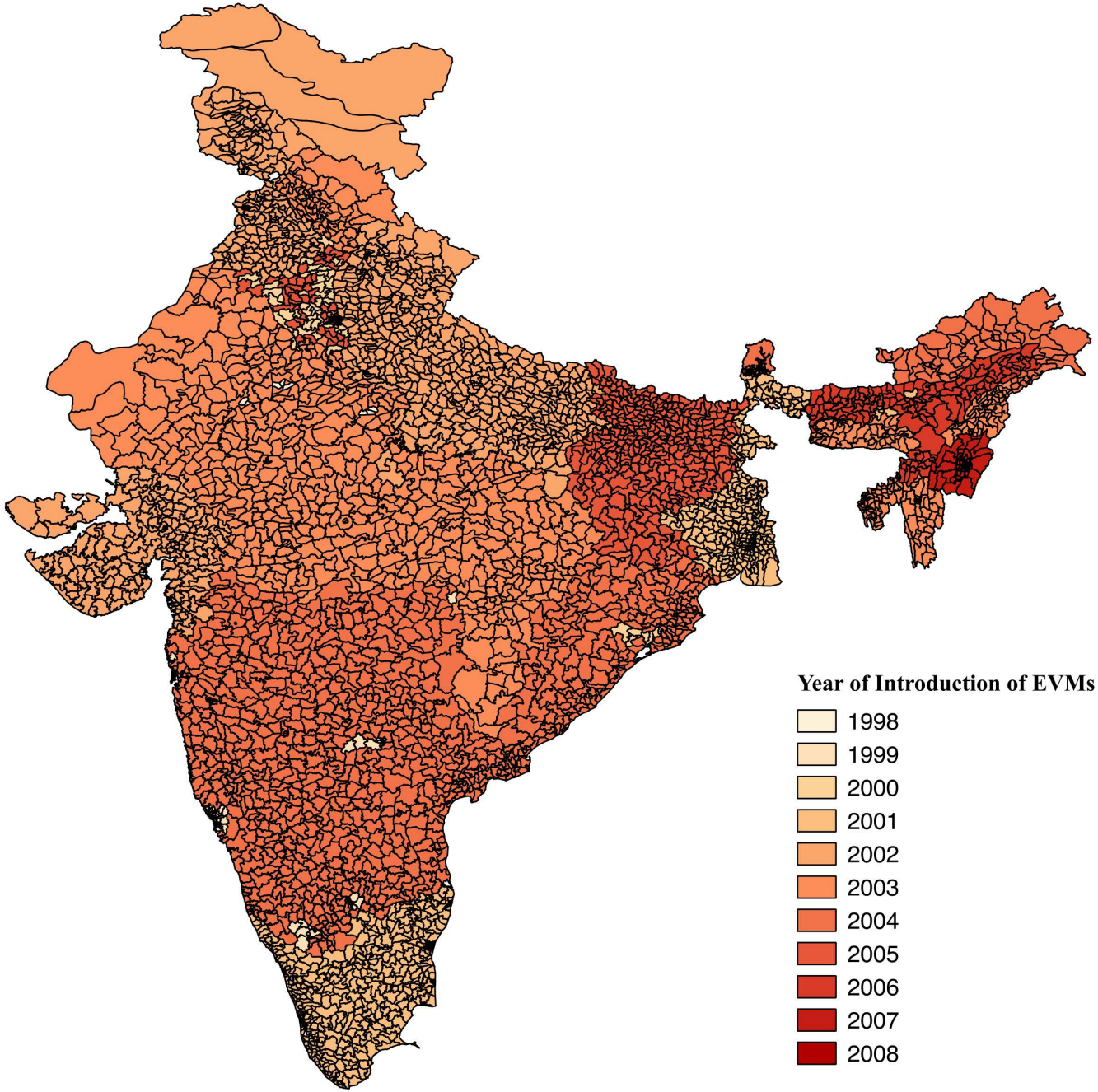
Time-line of Introduction of EVM



Time-line of Introduction of EVM

State	Year																		
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
Andhra Pradesh					0					0.05					1				0.35
Arunachal Pradesh	0					0				0					1				0.25
Assam		0					0					0.03					1		0.26
Bihar	0					0					0					1			0.33
Chhattisgarh														1					1
Delhi				0					0.09					1					0.36
Goa					0					1			1					1	0.75
Gujarat	0					0			0				1					1	0.40
Haryana		0					0				0.50					1			0.38
Himachal Pradesh	0			0					0					1				1	0.40
Jammu & Kashmir							0						1						0.50
Jharkhand																1			1
Karnataka					0					0.11					1				0.37
Kerala		0					0					1					1		0.50
Madhya Pradesh	0			0					0.02					1					0.20
Maharashtra	0					0				0.13					1				0.28
Manipur	0					0					0		0.10					1	0.22
Meghalaya				0					0					1					0.33
Mizoram				0					0					1					0.33
Nagaland				0					0					1					0.33
Orissa	0					0					0.05				1				0.26
Pondicherry	0	0					0					1					1		0.40
Punjab			0					0					1					1	0.50
Rajasthan	0			0					0.03					1					0.26
Sikkim					0					0					1				0.33
Tamil Nadu		0					0					1					1		0.50
Tripura				0					0					1					0.33
Uttar Pradesh		0		0			0						1					1	0.39
Uttarakhand													1					1	1
West Bengal		0					0					1					1		0.50
Total	0	0	0	0	0	0	0	0	0.02	0.12	0.08	0.85	0.94	1	1	1	1	1	0.37

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- Luminosity data from annual satellite nighttime lights images from NASA's military weather satellites (1992-2007).

Summary Statistics

	Paper Ballot Voting	Electronic Voting	Difference
Electors	122748.9 [55234]	173944.1 [86214.76]	51195.207***
Male Electors	64237.77 [31366.63]	90931.28 [47190.67]	26693.517***
Female Electors	58510.58 [25146.51]	83012.77 [39481.01]	24502.194***
Voters	75686.82 [34596.23]	107236.8 [45458.44]	31549.988***
Male Voters	42151.21 [19256.97]	57932.07 [25144.84]	15780.867***
Female Voters	33535.01 [16277.79]	49192.36 [21035.29]	15657.352***
Turnout	62.93 [14.03]	64.39 [13.27]	1.461
Male Turnout	67.06 [13.36]	66.51 [12.94]	-0.548
Female Turnout	58.61 [18.62]	61.89 [14.23]	3.279*
Winning Margin	15.46 [13.57]	11.44 [10.57]	-4.021***
Vote Share of the Winning Candidate	48.05 [11.11]	45.33 [10.09]	-2.723***
Rejected Votes	1925.31 [1594.61]	58.53 [278.22]	-1866.774***
Gender of the Winning Candidate (t-1)	.96 [.18]	.94 [.24]	-0.028***
Total Candidates (t-1)	8.56 [7.35]	8.92 [14.44]	0.354
No. of Phases	1.26 [.52]	2.1 [1.54]	0.842**

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  - Parliamentary constituency specific time trends.
- Our model does not capture time variant unobservable that are not explained by Parliamentary constituency specific time trends.

Main Specification

$$Y_{apt} = \beta_0 + \beta_{EV} EV_{apt} + \tau_t + \alpha_{apt} + \pi_p t + \beta_{\mathbf{x}} \mathbf{x}'_{ap(t-1)} + \epsilon_{apt}$$

EV_{apt}	Indicator for electronic voting
τ_t	Election Year fixed effects
α_{apt}	Assembly constituency fixed effects
$\pi_p t$	Parliamentary constituency specific time trends
$\mathbf{x}'_{\mathbf{ap(t-1)}}$	Winning candidate's gender, total contestants in $(t-1)$
ϵ_{apt}	i.i.d. errors robust and clustered at Parliamentary constituency-election year level

Effect of EVM on Voters & Voter Turnout

	(1)	(2)	(3)
Dependent Variable	Voters	Male Voters	Female Voters
Baseline Average	75687	42151	33535
Electronic Voting	−0.045***	−0.051***	−0.025*
	(0.01)	(0.01)	(0.01)
R Squared	0.950	0.954	0.931
No. of Observations	26581	26581	26579

Dependent Variable	Turnout	Male Turnout	Female Turnout
Baseline Average	62.93	67.06	58.61
Electronic Voting	−3.46***	−4.34***	−2.66***
	(0.61)	(0.71)	(0.67)
R Squared	0.847	0.760	0.725
No. of Observations	26581	26581	26581

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- Whether an eligible voters was able to cast her vote?
- Fear of violence, vote capture, forced out of polling booth?

$$Y_{iat} = \beta_0 + \beta_{EV} EV_{at} + \tau_t + \alpha_{at} + \beta_{\mathbf{x}} \mathbf{x}'_{iat} + \epsilon_{at}$$

Effects of EVM on Ability to Vote

	(1)	(2)	(3)	(4)	(5)	(6)
Baseline Average	.88	.87	.84	.86	.79	.83
Electronic Voting	0.028 (0.02)	-0.029 (0.02)	0.0085 (0.02)	0.00060 (0.02)	0.022 (0.02)	0.0050 (0.02)
Electronic Voting × Below Intermediate		0.067*** (0.02)				
Electronic Voting × Female			0.044*** (0.01)			
Electronic Voting × Lower Caste				0.047*** (0.01)		
Electronic Voting × Senior Citizen					0.062** (0.03)	
Electronic Voting × Below Intermediate - Female						0.057*** (0.01)
R Squared	0.040	0.041	0.040	0.040	0.041	0.041
No. of Observations	36273	36273	36273	36273	36380	36273

Effects of EVM on Vote Capture

	(1)	(2)	(3)	(4)	(5)	(6)
Baseline Average	.02	.02	.03	.03	.03	.03
Electronic Voting	-0.0066 (0.01)	0.0049 (0.01)	0.00040 (0.01)	0.0012 (0.01)	-0.0061 (0.01)	-0.00010 (0.01)
Electronic Voting × Below Intermediate		-0.013* (0.01)				
Electronic Voting × Female			-0.016*** (0.01)			
Electronic Voting × Lower Caste				-0.012** (0.01)		
Electronic Voting × Senior Citizen					-0.0072 (0.01)	
Electronic Voting × Below Intermediate - Female						-0.016*** (0.01)
R Squared	0.096	0.096	0.097	0.097	0.096	0.097
No. of Observations	36214	36214	36214	36214	36321	36214

Covariate Balance

	Paper Ballot Voting	Electronic Voting	Difference
Age	38.53 [14.42]	39.44 [14.74]	0.911
Gender	.45 [.5]	.46 [.5]	0.011
Not Intermediate	.86 [.34]	.78 [.41]	-0.083**
Lower Caste	.68 [.46]	.61 [.49]	-0.073
Senior Citizen	.09 [.28]	.1 [.3]	0.013
Below Intermediate - Female	.41 [.49]	.38 [.49]	-0.033
Hindu	.82 [.38]	.73 [.44]	-0.092
Muslim	.11 [.32]	.14 [.34]	0.023
Christian	.03 [.16]	.08 [.27]	0.056
Schedule Caste	.18 [.39]	.18 [.38]	-0.004
Schedule Tribe	.12 [.32]	.13 [.33]	0.011
Other Backward Caste	.39 [.49]	.31 [.46]	-0.079

Effects of EVM on Rejected Votes

Dependent Variable	Rejected Votes			
	(1)	(2)	(3)	(4)
Baseline Average	1925	1925	1925	1925
Electronic Voting	−2053.9***	−2079.9***	−2075.0***	−2092.8***
	(193.26)	(192.90)	(202.27)	(200.58)
Election Year FE	✓	✓	✓	✓
Total Electors		✓	✓	✓
Assembly Constituency FE			✓	✓
Number of Candidates(t-1)				✓
R Squared	0.701	0.705	0.744	0.746
No. of Observations	27445	27445	27445	26564

Re-poll Orders in 2004 Loksabha Election.

State	Number of Polling Stn.	Re-poll Orders	Avg. Re-poll Orders
Himachal Pradesh	6232	0	0
Dadra & Nagar Haveli	128	0	0
Nagaland	1586	0	0
Pondicherry	557	0	0
Daman & Diu	84	0	0
National Capital Territor	9039	0	0
Mizoram	798	0	0
Assam	17646	0	0
Maharashtra	62476	0	0
Chandigarh	409	0	0
Andaman & Nicobar Island	329	0	0
Manipur	2003	0	0
Arunachal Pradesh	1756	0	0
Lakshadweep	40	0	0
Uttaranchal	6807	0	0
Sikkim	349	0	0
Meghalaya	1582	0	0
Kerala	20333	0	0
Tripura	2372	0	0
Goa	1003	0	0
Gujarat	36830	2	0.00543
Jammu & Kashmir	7215	2	0.0277
Punjab	15649	6	0.0383
Tamil Nadu	45731	27	0.0590
Uttar Pradesh	102434	83	0.0810
West Bengal	48775	40	0.0820
Haryana	12574	11	0.0875
Madhya Pradesh	42285	38	0.0899
Rajasthan	35822	38	0.106
Karnataka	39795	49	0.123
Chhattisgarh	15670	22	0.140
Orissa	26250	41	0.156
Andhra Pradesh	56168	119	0.212
Jharkhand	17062	108	0.633
Bihar	49684	2589	5.211

Re-poll Orders in 2004 Loksabha Election.

State	Number of Polling Stn.	Re-poll Orders	Avg. Re-poll Orders
Himachal Pradesh	6232	0	0
Dadra & Nagar Haveli	128	0	0
Nagaland	1586	0	0
Pondicherry	557	0	0
Daman & Diu	84	0	0
National Capital Territor	9039	0	0
Mizoram	798	0	0
Assam	17646	0	0
Maharashtra	62476	0	0
Chandigarh	409	0	0
Andaman & Nicobar Island	329	0	0
Manipur	2003	0	0
Arunachal Pradesh	1756	0	0
Lakshadweep	40	0	0
Uttaranchal	6807	0	0
Sikkim	349	0	0
Meghalaya	1582	0	0
Kerala	20333	0	0
Tripura	2372	0	0
Goa	1003	0	0
Gujarat	36830	2	0.00543
Jammu & Kashmir	7215	2	0.0277
Punjab	15649	6	0.0383
Tamil Nadu	45731	27	0.0590
Uttar Pradesh	102434	83	0.0810
West Bengal	48775	40	0.0820
Haryana	12574	11	0.0875
Madhya Pradesh	42285	38	0.0899
Rajasthan	35822	38	0.106
Karnataka	39795	49	0.123
Chhattisgarh	15670	22	0.140
Orissa	26250	41	0.156
Andhra Pradesh	56168	119	0.212
Jharkhand	17062	108	0.633
Bihar	49684	2589	5.211

Heterogeneity in the Effects of EVM.

	(1)	(2)	(3)
Dependent Variable	Voters	Male Voters	Female Voters
Baseline Average	75687	42151	33535
Electronic Voting	-0.034***	-0.036***	-0.016
	(0.01)	(0.01)	(0.01)
Electronic Voting × High Re-poll States	-0.078***	-0.10***	-0.062***
	(0.02)	(0.02)	(0.02)
R Squared	0.950	0.954	0.931
No. of Observations	26581	26581	26579

Dependent Variable	Turnout	Male Turnout	Female Turnout
Baseline Average	62.93	67.06	58.61
Electronic Voting	-3.03***	-3.73***	-2.49***
	(0.60)	(0.68)	(0.69)
Electronic Voting × High Re-poll States	-3.01***	-4.29***	-1.18
	(0.97)	(1.11)	(0.93)
R Squared	0.847	0.760	0.725
No. of Observations	26581	26581	26581

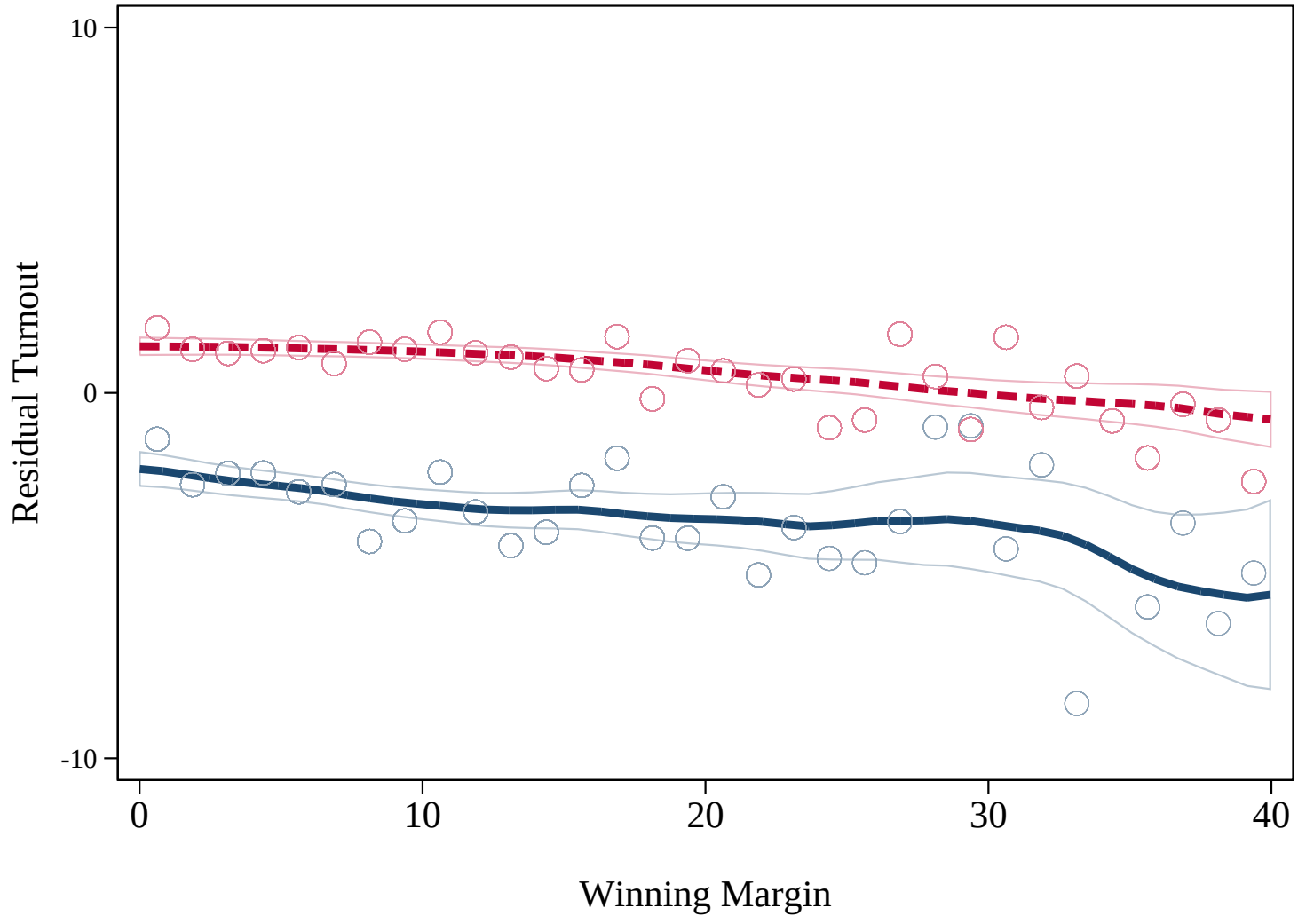
Criminal Cases against MLAs

States	Constituencies	MLAs	Criminal Cases		Serious Criminal Cases		Election
		Analysed	No.	Frac.	No.	Frac.	Year
Nagaland	60	56	0	0.00	0	0.00	2008
Arunachal Pradesh	60	60	2	3.33	0	0.00	2004
Mizoram	40	38	4	10.53	0	0.00	2008
Goa	40	40	9	22.50	0	0.00	2007
Manipur	60	60	1	1.67	1	1.67	2007
Meghalaya	60	60	1	1.67	1	1.67	2008
Tripura	60	57	3	5.26	1	1.75	2008
Sikkim	32	32	1	3.13	1	3.13	2009
Jammu & Kashmir	87	60	6	10.00	2	3.33	2008
Assam	189	126	7	5.56	5	3.97	2006
Rajasthan	200	197	31	15.74	8	4.06	2008
Punjab	117	117	20	17.09	5	4.27	2007
Karnataka	225	218	44	20.18	18	8.26	2008
Delhi	70	68	29	42.65	6	8.82	2008
Chattisgarh	90	85	11	12.94	8	9.41	2008
Andhra Pradesh	293	284	74	26.06	27	9.51	2009
Uttarakhand	70	70	17	24.29	7	10.00	2007
West Bengal	307	283	45	15.90	30	10.60	2006
Tamil Nadu	237	234	77	32.91	25	10.68	2006
Himachal Pradesh	68	68	26	38.24	8	11.76	2007
Gujarat	182	182	47	25.82	22	12.09	2007
Kerala	140	139	68	48.92	17	12.23	2006
Madhya Pradesh	230	219	58	26.48	27	12.33	2008
Haryana	90	90	28	31.11	13	14.44	2005
Orissa	147	145	58	40.00	24	16.55	2004
Pondicherry	30	30	6	20.00	5	16.67	2006
Uttar Pradesh	402	402	142	35.32	75	18.66	2007
Maharashtra	288	288	132	45.83	54	18.75	2004
Jharkhand	81	72	31	43.06	18	25.00	2005
Bihar	260	233	117	50.21	68	29.18	2005

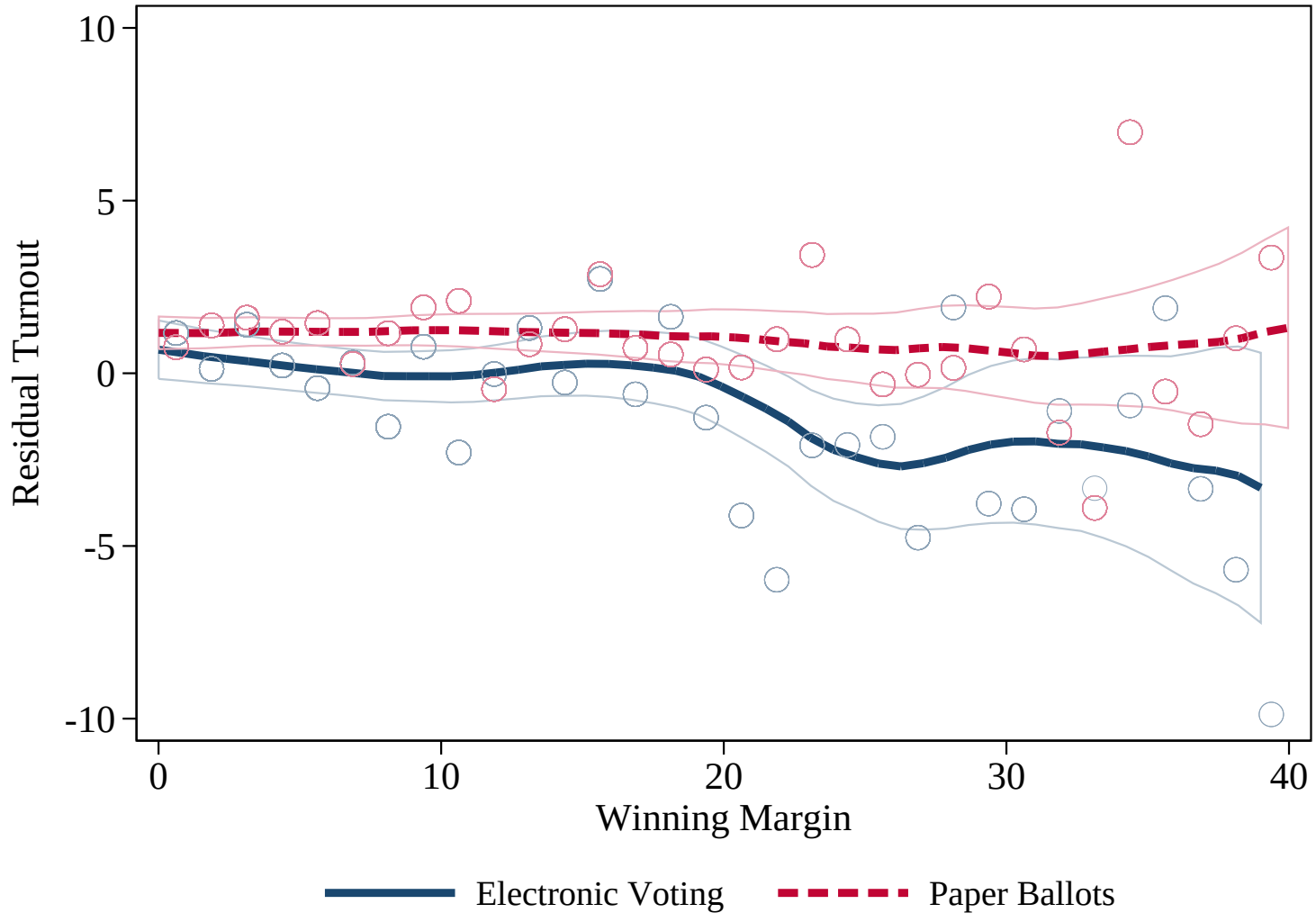
Criminal Cases against MLAs

States	Constituencies	MLAs	Criminal Cases		Serious Criminal Cases		Election
		Analysed	No.	Frac.	No.	Frac.	Year
Nagaland	60	56	0	0.00	0	0.00	2008
Arunachal Pradesh	60	60	2	3.33	0	0.00	2004
Mizoram	40	38	4	10.53	0	0.00	2008
Goa	40	40	9	22.50	0	0.00	2007
Manipur	60	60	1	1.67	1	1.67	2007
Meghalaya	60	60	1	1.67	1	1.67	2008
Tripura	60	57	3	5.26	1	1.75	2008
Sikkim	32	32	1	3.13	1	3.13	2009
Jammu & Kashmir	87	60	6	10.00	2	3.33	2008
Assam	189	126	7	5.56	5	3.97	2006
Rajasthan	200	197	31	15.74	8	4.06	2008
Punjab	117	117	20	17.09	5	4.27	2007
Karnataka	225	218	44	20.18	18	8.26	2008
Delhi	70	68	29	42.65	6	8.82	2008
Chattisgarh	90	85	11	12.94	8	9.41	2008
Andhra Pradesh	293	284	74	26.06	27	9.51	2009
Uttarakhand	70	70	17	24.29	7	10.00	2007
West Bengal	307	283	45	15.90	30	10.60	2006
Tamil Nadu	237	234	77	32.91	25	10.68	2006
Himachal Pradesh	68	68	26	38.24	8	11.76	2007
Gujarat	182	182	47	25.82	22	12.09	2007
Kerala	140	139	68	48.92	17	12.23	2006
Madhya Pradesh	230	219	58	26.48	27	12.33	2008
Haryana	90	90	28	31.11	13	14.44	2005
Orissa	147	145	58	40.00	24	16.55	2004
Pondicherry	30	30	6	20.00	5	16.67	2006
Uttar Pradesh	402	402	142	35.32	75	18.66	2007
Maharashtra	288	288	132	45.83	54	18.75	2004
Jharkhand	81	72	31	43.06	18	25.00	2005
Bihar	260	233	117	50.21	68	29.18	2005

Winning Margin: More Criminal MLA States



Winning Margin: Less Criminal MLA States



Electronic Voting
Paper Ballots

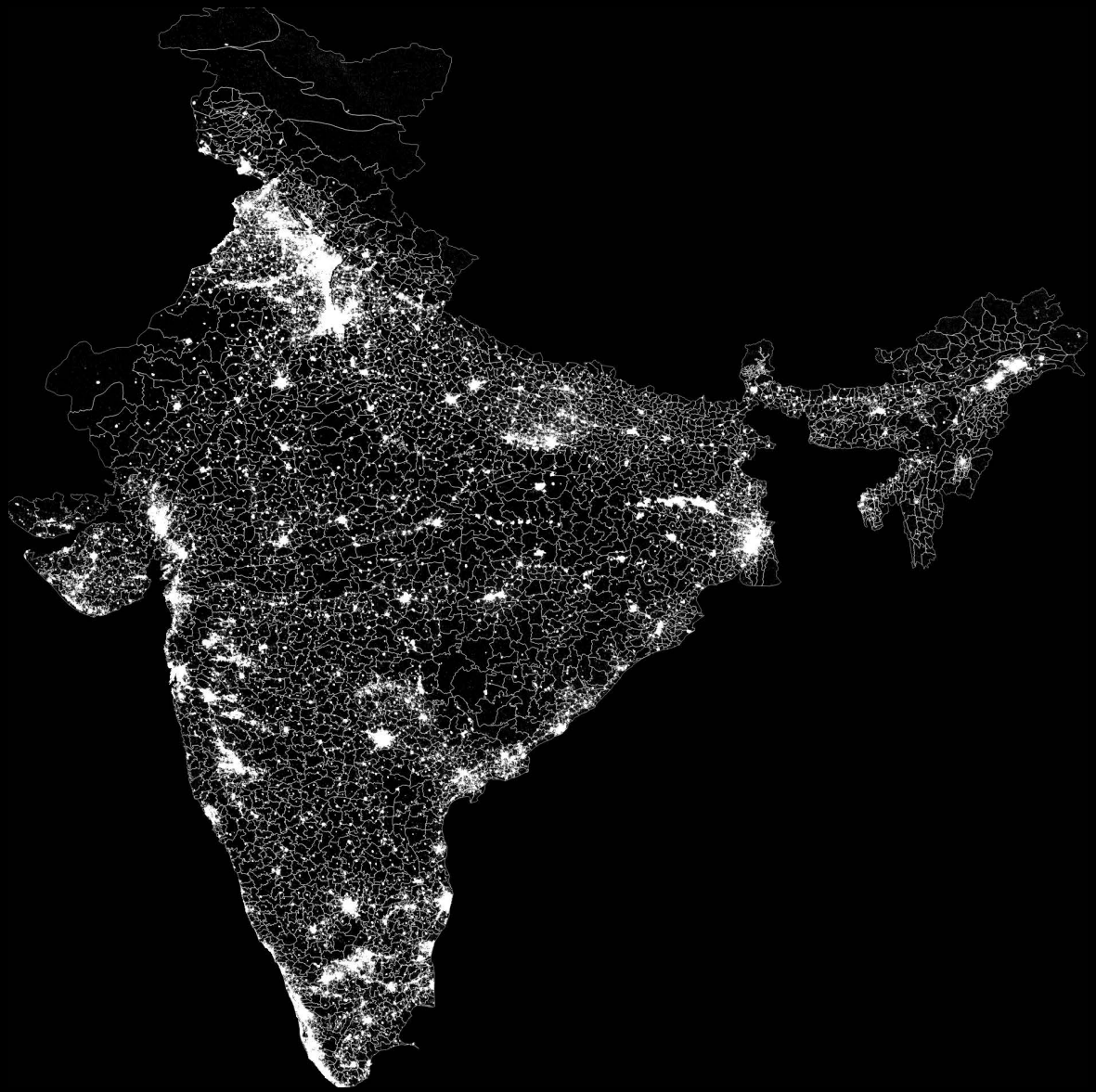
Close Elections

↓ Dependent Variable	Avg. under Paper Ballot [Std. Dev.]	Effects of Electronic Voting (1)	(2)	(3)	(4)
		Panel A: All India			
Turnout	62.93 [14.03]	-4.69** (1.9)	-4.98** (1.99)	-6.19*** (1.48)	-6.07*** (1.51)
Male Turnout	67.06 [13.36]	-5.19*** (1.9)	-5.32*** (2)	-6.75*** (1.49)	-6.71*** (1.53)
Female Turnout	58.61 [18.62]	-4.03* (2.06)	-4.48** (2.15)	-5.41*** (1.61)	-5.17*** (1.67)
Observation		3521	3521	6807	6807
		Panel B: States with Serious Criminal Charges against Elected Members			
Turnout	56.06 [11.82]	-14.51* (8.29)	-14.7* (8.37)	-17.6*** (4.46)	-17.65*** (4.52)
Male Turnout	61.8 [13.94]	-15.84* (8.5)	-16.29* (8.63)	-19.36*** (4.59)	-19.37*** (4.67)
Female Turnout	49.76 [14.05]	-13.49 (8.31)	-13.34 (8.39)	-16.1*** (4.49)	-15.95*** (4.61)
Observation		1157	1157	2245	2245
		Panel C: States with Fewer Criminal Charges against Elected Members			
Turnout	65.87 [13.87]	-2.46 (1.74)	-2.52 (1.88)	-3.55*** (1.38)	-3.48** (1.43)
Male Turnout	69.31 [12.45]	-2.27 (1.68)	-2.07 (1.83)	-3.33*** (1.27)	-3.33** (1.31)
Female Turnout	62.41 [19.04]	-2.49 (1.96)	-2.85 (2.1)	-3.68** (1.61)	-3.58** (1.69)
Observation		2364	2364	4562	4562
Winning margin <		2.5	2.5	5	5
Specification		Linear	Quadratic	Linear	Quadratic

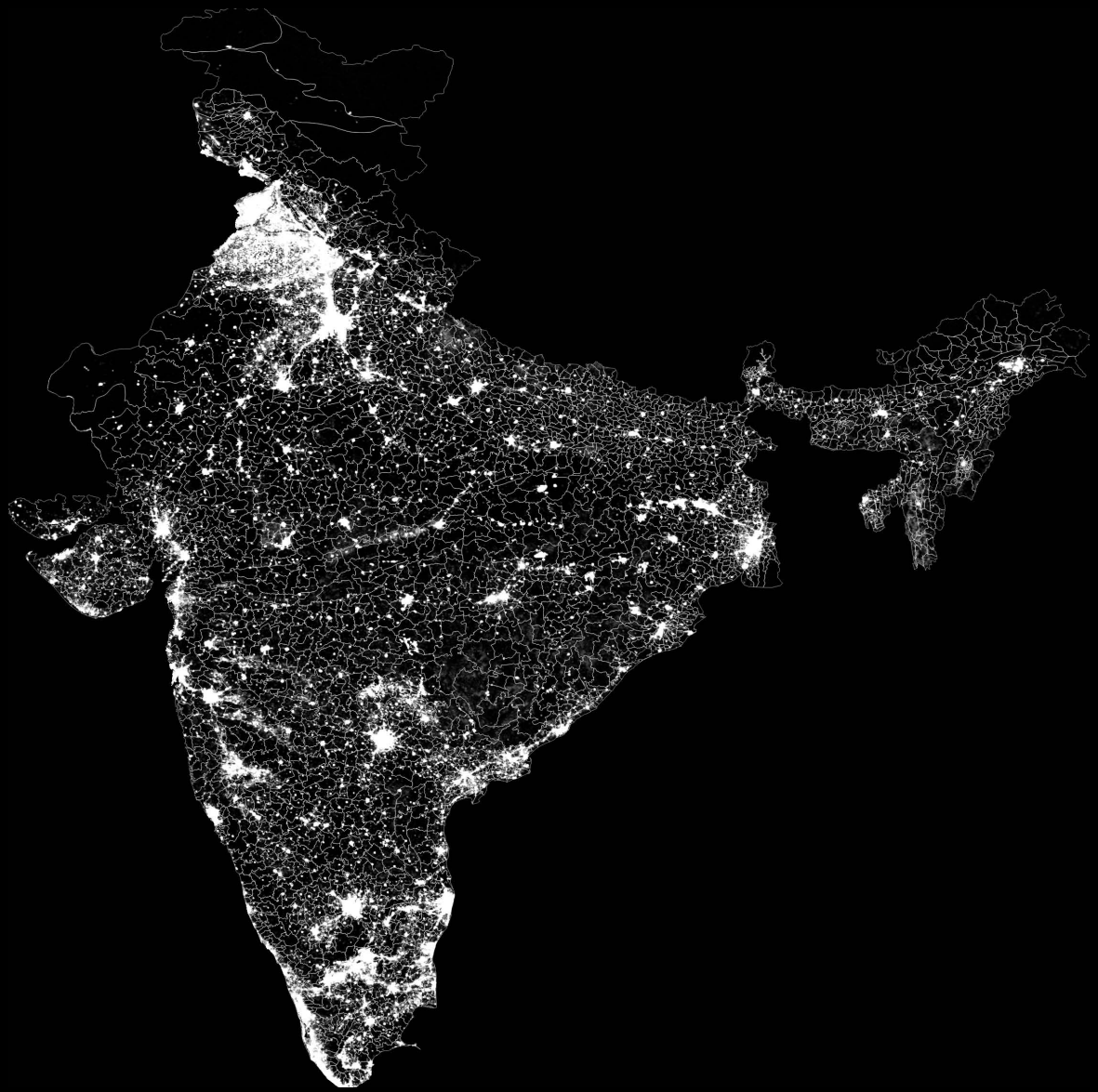
Incumbent Party's Vote Share and Reelection

	(1)	(2)
Dependent variable	Vote share	Reelection
Baseline Average	35.08	.35
	Panel A	
Electronic Voting	-2.75**	0.066*
	(1.34)	(0.03)
R Squared	0.454	0.299
No. of Observations	22021	26581
	Panel B	
Electronic Voting	-1.28	0.099***
	(1.44)	(0.03)
Electronic Voting × Highest Re-poll States	-9.85***	-0.23***
	(1.76)	(0.05)
R Squared	0.455	0.300
No. of Observations	22021	26581

Nighttime Lights: 1992



Nighttime Lights: 2007



Effect of EVM on Log Luminosity

Lead length	1 period	2 periods	3 periods	4 periods	Average
Baseline Average	5.16	5.15	5.27	5.08	5.23
Electronic Voting	-0.071	0.11***	0.13**	0.23***	0.096**
	(0.05)	(0.04)	(0.05)	(0.05)	(0.04)
R Squared	0.973	0.967	0.971	0.970	0.976
No. of Observations	12376	12294	11662	10598	12385

Effects of EVM on total IPC Crime

Lead length	1 period (1)	2 periods (2)	3 periods (3)	4 periods (4)	Average (5)
	Panel A: Total IPC crime (Log)				
Baseline Average	3244	3320	3270	3286	3275
EVM	0.13**	0.097**	0.036	-0.034	0.059
	(0.05)	(0.04)	(0.05)	(0.06)	(0.04)
EVM $\times$ Criminal Legislatures	-0.31***	-0.17***	-0.19***	-0.13***	-0.20***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
R Squared	0.967	0.976	0.969	0.973	0.981
No. of Observations	2141	2140	2127	2125	2141

Effects of EVM on Homicide

Lead length	1 period (1)	2 periods (2)	3 periods (3)	4 periods (4)	Average (5)
		Panel B: Murder (Log)			
Baseline Average	77	78	78	76	77
EVM	0.017	0.013	-0.19**	-0.18**	-0.083*
	(0.08)	(0.08)	(0.08)	(0.08)	(0.05)
EVM × Criminal Legislatures	-0.40***	-0.30***	-0.29***	-0.21***	-0.30***
	(0.06)	(0.05)	(0.05)	(0.05)	(0.04)
R Squared	0.936	0.936	0.937	0.941	0.968
No. of Observations	2133	2129	2117	2118	2140

Effects of EVM on Crime against Women

Lead length	1 period (1)	2 periods (2)	3 periods (3)	4 periods (4)	Average (5)
		Panel D: Rape (Log)			
Baseline Average	27	28	28	29	28
EVM	0.056	-0.085	0.053	0.00061	-0.020
	(0.09)	(0.11)	(0.09)	(0.11)	(0.09)
EVM $\times$ Criminal Legislatures	-0.27***	-0.19**	-0.48***	-0.29***	-0.32***
	(0.08)	(0.08)	(0.08)	(0.07)	(0.06)
R Squared	0.882	0.876	0.870	0.888	0.940
No. of Observations	2086	2091	2072	2079	2131

Robustness

- Covariate balance.
- IV estimates.
- Placebo year of introduction.
- Other confounding factors.

Covariate Balance

- Identification strategy: Generalized diff-in-diff.
- Main assumption: Groups are comparable.
- The summary statistics table does not confirm this.
- We restrict our sample such that the groups are comparable.
- First restriction: Elections between 1996–2001
- Second restriction: Common support
- Predict use of voting machines on observables

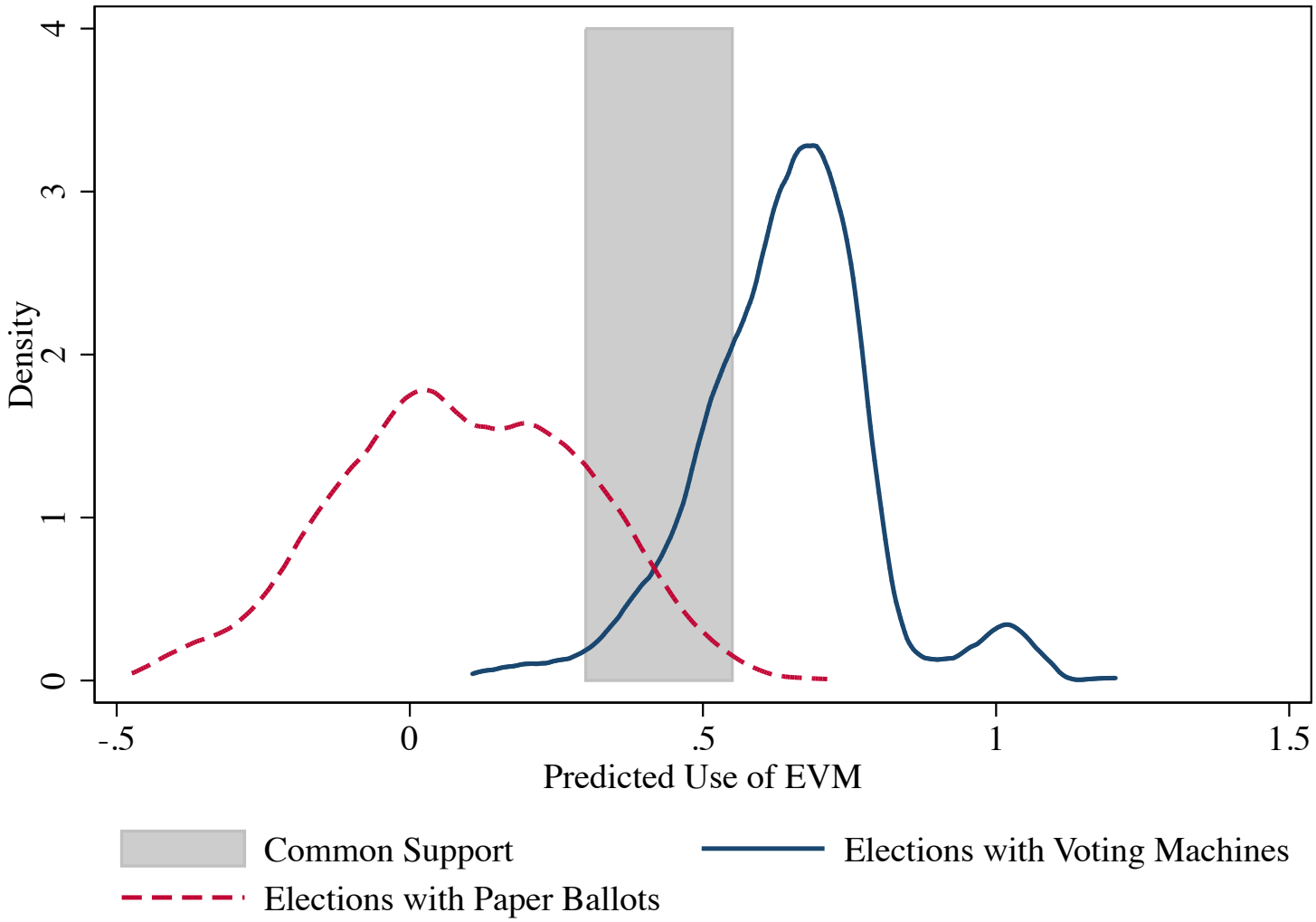
$$EV_{apt} = \alpha_0 + \alpha_{PC} I_{within45PC} + \alpha_t t + \alpha_{\mathbf{x}} \mathbf{x}'_{apt} + \epsilon_{apt}$$

$\mathbf{x}'_{apt}$ include electors, candidates, population and literacy rates by gender, fraction of urban population, fraction of population by caste, fraction of cultivators (Census 2001)

Predicted use of EVM in Assembly Constituency

	(1)
EVMs used in *loksabha* in 1999	0.29***
	(0.02)
Year	0.14***
	(0.00)
Electors	0.000000031
	(0.00)
Total Candidates	0.0010
	(0.00)
Urban Population	-0.000000010
	(0.00)
Male Literacy Rate	-0.00056
	(0.00)
Female Literacy Rate	0.0043***
	(0.00)
Percent of SC population	0.0061***
	(0.00)
Percent of ST population	0.00032
	(0.00)
Percent Cultivation	-0.0041***
	(0.00)
Percent of Female population	0.0059**
	(0.00)
R Squared	0.549
No. of Observations	3623

Predicted use of EVM and Common Support



Summary Statistics (Full Sample)

	Paper Ballot Voting	Electronic Voting	Difference
Electors	122748.9 [55234]	173944.1 [86214.76]	51195.207***
Male Electors	64237.77 [31366.63]	90931.28 [47190.67]	26693.517***
Female Electors	58510.58 [25146.51]	83012.77 [39481.01]	24502.194***
Voters	75686.82 [34596.23]	107236.8 [45458.44]	31549.988***
Male Voters	42151.21 [19256.97]	57932.07 [25144.84]	15780.867***
Female Voters	33535.01 [16277.79]	49192.36 [21035.29]	15657.352***
Turnout	62.93 [14.03]	64.39 [13.27]	1.461
Male Turnout	67.06 [13.36]	66.51 [12.94]	-0.548
Female Turnout	58.61 [18.62]	61.89 [14.23]	3.279*
Winning Margin	15.46 [13.57]	11.44 [10.57]	-4.021***
Vote Share of the Winning Candidate	48.05 [11.11]	45.33 [10.09]	-2.723***
Rejected Votes	1925.31 [1594.61]	58.53 [278.22]	-1866.774***
Gender of the Winning Candidate (t-1)	.96 [.18]	.94 [.24]	-0.028***
Total Candidates (t-1)	8.56 [7.35]	8.92 [14.44]	0.354
No. of Phases	1.26 [.52]	2.1 [1.54]	0.842**

Summary Statistics (Common Support)

	Paper Ballot Voting	Electronic Voting	Difference
Electors	144270.5 [71458.11]	161701.7 [43415.64]	17431.141
Male Electors	75155.59 [38242.23]	82533.54 [22310.3]	7377.955
Female Electors	69114.93 [33592.21]	79168.12 [21560.02]	10053.186
Gender of the Winning Candidate (t-1)	.96 [.2]	.93 [.25]	-0.025
Total Candidates (t-1)	13.81 [10.28]	13.89 [11.76]	0.080
No. of Phases	1.78 [.75]	1.12 [.46]	-0.666**

Effect of EVM on Common Support.

	(1)	(2)	(3)
Dependent Variable	Turnout	Male Turnout	Female Turnout
Baseline Average	70	73	67
Electronic Voting	-5.15**	-4.56**	-5.77**
	(2.05)	(1.92)	(2.25)
R Squared	0.805	0.764	0.814
No. of Observations	659	659	659

IV Estimates

- EVMs were introduced in 45 *Loksabha* constituencies in 1999.
- Affected use of EVMs for the states that were scheduled for election in 1999 and 2000 and for constituencies within the 45 Parliamentary constituencies.
- We restrict our sample to elections immediately before and after 1999-2000.
- Use location within 45 PC interacted with an indicator for the year 1999 as an instrument for electronic voting.
- First stage:

$$EV_{apt} = \alpha_0 + \alpha_{IV}\left(I_{within45PC} \times I_{year=1999}\right) + \tau_t + \alpha_p + \alpha_{\mathbf{x}}\mathbf{x}'_{apt} + \epsilon_{apt}$$

- Second stage:

$$Y_{ast} = \beta_0 + \beta_{EV}\widehat{EV_{apt}} + \tau_t + \alpha_p + \beta_{\mathbf{x}}\mathbf{x}'_{apt} + \nu_{apt}$$

IV Estimates

	(1)	(2)	(3)
Dependent Variable	Turnout	Male Turnout	Female Turnout
Baseline Average	67.79	71.19	64.11
PANEL A: First Stage			
Within 45 PC × Year = 1999	0.96***	0.96***	0.96***
	(0.02)	(0.02)	(0.02)
No. of Observations	7138	7138	7138
Kleibergen-Paap F-stat	3376.786	3376.786	3376.786
PANEL B: Second Stage			
Electronic Voting	-3.28***	-2.92***	-3.89***
	(0.74)	(0.79)	(0.78)
R Squared	0.010	0.011	0.007
No. of Observations	7138	7138	7138

Placebo Year of Introduction.

	(1)	(2)	(3)
Dependent Variable Baseline Average	Turnout	Male Turnout	Female Turnout
Electronic Voting (Shuffled)	-0.070 (0.19)	-0.090 (0.20)	0.021 (0.21)
R Squared	0.846	0.759	0.725
No. of Observations	26581	26581	26581

Other Confounding Factors

- Use of voter identity cards and other fraud preventing measures by the ECI.
- Use of security forces.

EVM, # Election Phases, and Turnout

	(1)	(2)	(3)
Panel A: Effect of EVM on log Voters			
Dependent Variable	Voters	Male Voters	Female Voters
Baseline Average	75687	42151	33535
Electronic Voting	−0.054***	−0.061***	−0.035**
	(0.01)	(0.01)	(0.01)
No. of Phases	−0.041***	−0.042***	−0.041***
	(0.00)	(0.00)	(0.00)
R Squared	0.951	0.955	0.932
No. of Observations	26581	26581	26579
Panel B: Effect of EVM on Voter Turnout			
Dependent Variable	Turnout	Male Turnout	Female Turnout
Baseline Average	62.93	67.06	58.61
Electronic Voting	−3.96***	−4.90***	−3.08***
	(0.65)	(0.72)	(0.71)
No. of Phases	−2.07***	−2.32***	−1.77***
	(0.17)	(0.17)	(0.21)
R Squared	0.851	0.766	0.727
No. of Observations	26581	26581	26581

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