

ONLINE APPENDIX

CROSS-STATE STRATEGIC VOTING

Gordon B. Dahl, Joseph Engelberg, Runjing Lu, and William Mullins

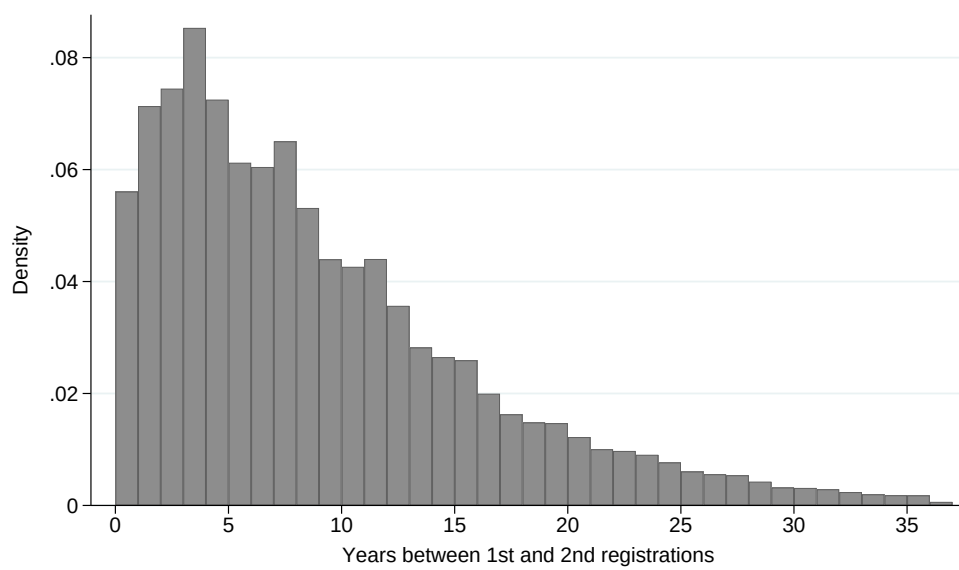


Figure A1: NUMBER OF YEARS BETWEEN FIRST AND SECOND REGISTRATIONS

Note: This figure plots the number of years between when an individual registers in their first state and in their second state in our sample.

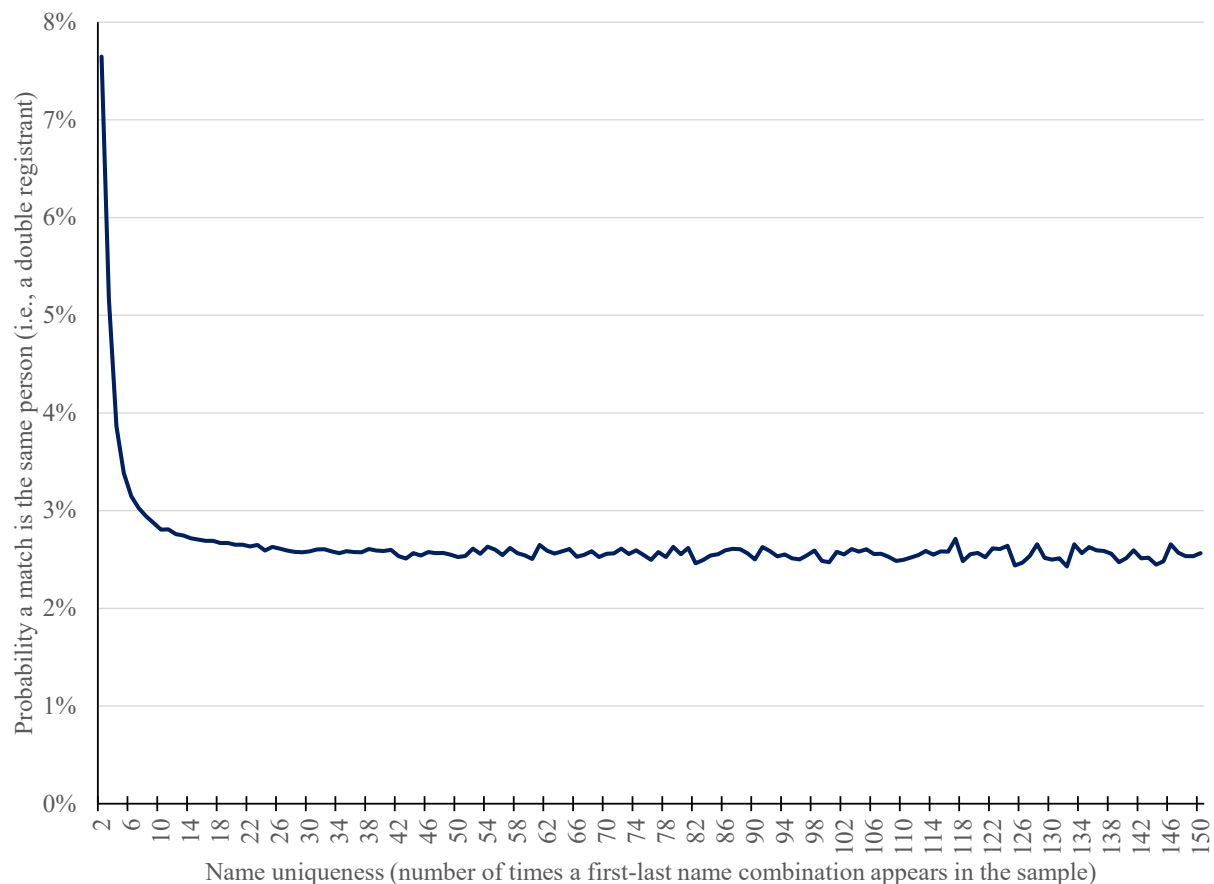


Figure A2: PROBABILITY A NAME MATCH ACROSS STATES IS THE SAME PERSON BY LEVEL OF NAME UNIQUENESS

Note: This figure plots the estimated probability that two registration records in different states with matching first and last names correspond to the same person, estimated separately for each level of name uniqueness. Name uniqueness (NU) is the total number of times a (first name, last name) combination occurs in our sample of 2020 U.S. voter registration records. Section 3 describes the estimation procedure.

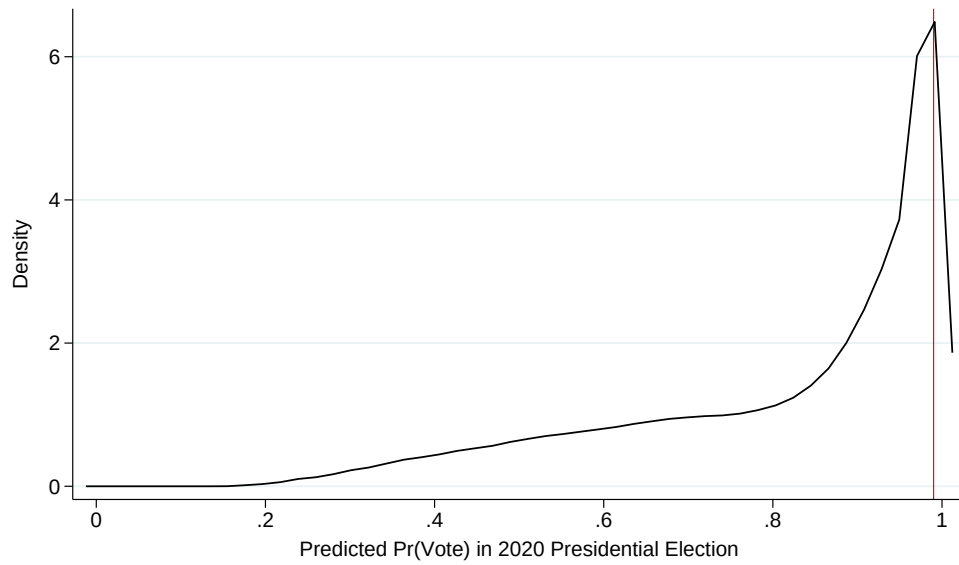
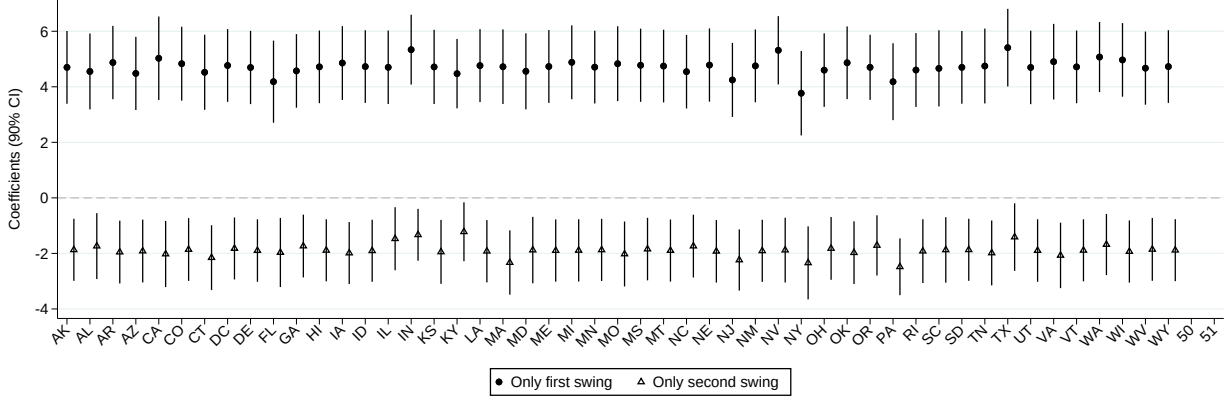
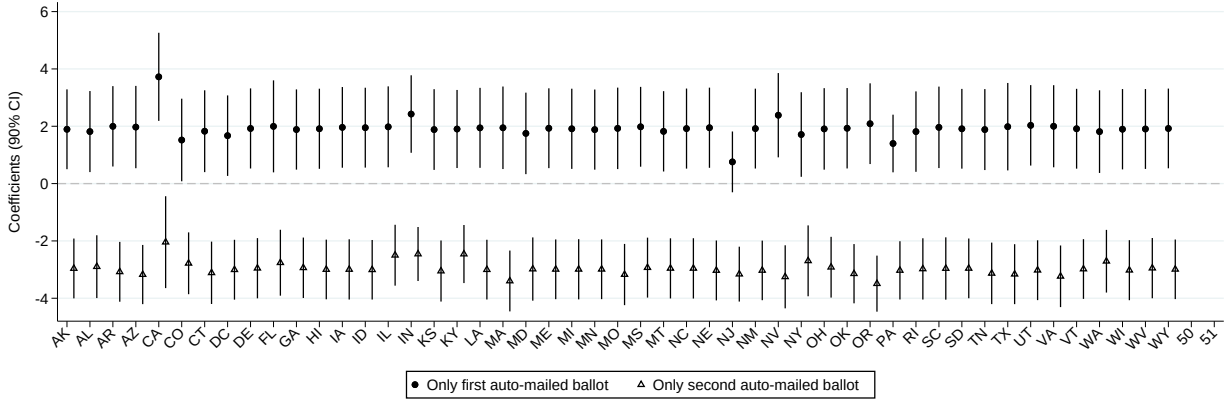


Figure A3: PREDICTED PROBABILITY OF VOTING IN THE 2020 PRESIDENTIAL ELECTION

Note: This figure plots the kernel density of double-registrants' predicted likelihood of voting in the 2020 presidential election. The likelihood is estimated from a probit model in our double-registrant sample using the following variables as predictors: occupation, work industry, and demographics (gender, race, birth cohort, marital status, presence of children in the home, homeownership, as well as zip code-level housing wealth and income groups) interacted with political donor status and voting history in even-year general and primary elections (2008-2020). The vertical red line displays the cutoff used in Tables 2 and 7: a predicted voting probability of 0.99.



(a) CSSV incentive estimates



(b) CSSV cost estimates

Figure A4: ROBUSTNESS: EXCLUDING ONE STATE AT A TIME

Note: This figure plots the coefficient estimates (and 95% confidence intervals) for CSSV incentive and cost variables using the specification in Table 2 column 1 while excluding one state at a time. Estimates for *Only first swing* and *Only second swing* are plotted in panel (a) and those for *Only first auto-mailed ballot* and *Only second auto-mailed ballot* in panel (b). The excluded state (either first or second state) is labeled on the x-axis. Everything else follows Table 2 column 1.

Table A1: VOTER REGISTRATIONS BY STATE: L2 DATA AND EAVS

State	Total registration			Active registration			Inactive registration		
	L2	EAVS	L2/EAVS (%)	L2	EAVS	L2/EAVS (%)	L2	EAVS	L2/EAVS (%)
AK	544,865	646,093	84.3	532,119	595,647	89.3	12,746	50,446	25.3
AL	3,360,248	3,717,798	90.4	2,994,930	3,438,213	87.1	365,318	279,585	130.7
AR	1,560,875	1,831,414	85.2	1,175,076	1,408,061	83.5	385,799	423,353	91.1
AZ	4,089,871	4,728,109	86.5	3,781,982	4,275,729	88.5	307,889	452,380	68.1
CA	21,124,608	-	-	20,877,284	-	-	247,325	-	-
CO	3,667,315	4,211,528	87.1	3,578,369	3,803,762	94.1	88,946	407,766	21.8
CT	2,303,818	2,524,717	91.3	2,124,782	2,335,860	91	179,036	188,857	94.8
DC	454,482	625,683	72.6	429,570	517,890	82.9	24,912	107,793	23.1
DE	689,262	739,672	93.2	648,370	711,287	91.2	40,892	28,385	144.1
FL	13,875,629	15,218,424	91.2	12,955,508	14,517,002	89.2	920,121	701,422	131.2
GA	6,832,209	7,618,436	89.7	6,462,992	7,194,889	89.8	369,217	423,547	87.2
HI	771,937	-	-	714,106	-	-	57,831	-	-
IA	2,100,838	2,243,758	93.6	1,966,810	2,094,770	93.9	134,028	148,988	90
ID	898,418	1,029,763	87.2	839,004	1,029,763	81.5	59,414	-	-
IL	8,096,315	9,789,893	82.7	7,465,362	9,103,542	82	630,953	686,351	91.9
IN	4,236,229	4,692,091	90.3	3,652,052	4,170,353	87.6	584,177	521,738	112
KS	1,716,961	1,913,573	89.7	1,602,484	1,764,949	90.8	114,477	148,624	77
KY	3,161,547	3,565,428	88.7	2,912,392	3,319,307	87.7	249,155	246,121	101.2
LA	2,953,020	3,093,004	95.5	2,836,316	2,963,901	95.7	116,704	129,103	90.4
MA	4,439,104	4,812,909	92.2	3,922,652	4,400,254	89.1	516,452	412,655	125.2
MD	4,029,633	4,298,942	93.7	3,879,585	4,142,347	93.7	150,048	156,595	95.8
ME	983,978	1,138,576	86.4	934,708	1,135,008	82.4	49,270	3,568	1380.9
MI	7,294,117	8,105,524	90	6,761,976	7,209,300	93.8	532,141	896,224	59.4
MN	3,487,062	3,731,016	93.5	3,436,140	3,731,016	92.1	50,922	-	-
MO	3,985,784	4,338,133	91.9	3,590,033	3,963,980	90.6	395,751	374,153	105.8
MS	1,934,546	2,143,149	90.3	1,736,102	1,982,632	87.6	198,444	160,517	123.6
MT	640,332	747,439	85.7	571,625	675,971	84.6	68,707	71,468	96.1
NC	6,462,612	7,372,608	87.7	5,690,869	6,607,121	86.1	771,743	765,487	100.8
NE	1,147,639	1,266,730	90.6	1,050,614	1,168,708	89.9	97,025	98,022	99
NJ	5,851,577	6,310,564	92.7	5,454,103	5,896,836	92.5	397,474	413,728	96.1
NM	1,103,371	1,360,871	81.1	1,079,136	1,255,669	85.9	24,235	105,202	23
NV	1,753,625	2,039,162	86	1,524,037	1,835,401	83	229,588	203,761	112.7
NY	12,278,622	13,554,842	90.6	11,375,576	12,362,997	92	903,046	1,191,845	75.8
OH	7,442,327	8,073,829	92.2	6,797,392	8,073,829	84.2	644,935	-	-
OK	1,981,465	2,259,107	87.7	1,696,503	2,021,846	83.9	284,962	237,261	120.1
OR	3,079,424	2,944,588	104.6	2,756,422	2,944,588	93.6	323,002	-	-
PA	8,317,758	9,035,061	92.1	7,629,443	8,280,348	92.1	688,315	754,713	91.2
RI	755,008	809,117	93.3	694,819	735,195	94.5	60,189	73,922	81.4
SC	3,312,165	3,854,209	85.9	2,892,210	3,535,061	81.8	419,955	319,148	131.6
SD	537,360	635,256	84.6	468,534	578,683	81	68,826	56,573	121.7
TN	3,995,188	4,436,727	90	3,710,495	4,226,928	87.8	284,693	209,799	135.7
TX	15,933,926	16,955,520	94	14,121,565	15,279,870	92.4	1,812,361	1,675,649	108.2
UT	1,382,572	1,861,977	74.3	1,238,198	1,713,297	72.3	144,374	148,680	97.1
VA	5,493,823	5,975,561	91.9	5,205,669	5,763,187	90.3	288,154	212,374	135.7
VT	454,367	489,277	92.9	405,685	440,920	92	48,682	48,357	100.7
WA	4,783,984	5,255,466	91	4,462,776	4,892,871	91.2	321,208	362,595	88.6
WI	4,577,219	3,834,164	119.4	3,169,168	3,834,164	82.7	1,408,051	-	-
WV	1,145,489	1,269,024	90.3	969,037	1,062,685	91.2	176,452	206,339	85.5
WY	233,910	303,049	77.2	226,281	303,049	74.7	7,629	-	-

Note: This table reports the numbers of total, active, and inactive registrations in the L2 data and in EAVS for states in our sample. “-” indicates missing data in EAVS.

Table A2: STATE ELECTION CHARACTERISTICS

State	Swing PredictIt	Auto-mailed ballot	Swing NYT	Swing Ex-ante	Swing Ex-post	Early Voting	Auto absentee Application	Auto voter Registration	Election day Registration	Fast Removal	Frequent Update	High Tax
AK	N	N	N	Y	N	N	N	Y	N	Y	Y	N
AL	N	N	N	N	N	Y	N	N	N	N	N	N
AR	N	N	N	N	N	N	N	N	N	Y	N	Y
AZ	Y	N	Y	Y	Y	Y	N	N	N	Y	N	N
CA	N	Y	N	N	N	Y	N	Y	Y	N	Y	Y
CO	N	Y	N	N	N	N	N	Y	Y	Y	Y	N
CT	N	N	N	N	N	N	Y	Y	Y	N	Y	Y
DC	N	Y	N	N	N	N	N	Y	Y	Y	N	Y
DE	N	N	N	N	N	N	Y	N	N	N	N	Y
FL	Y	N	Y	Y	Y	N	N	N	N	N	N	N
GA	Y	N	Y	Y	Y	Y	N	Y	N	N	Y	N
HI	N	Y	N	N	N	N	N	N	Y	-	N	Y
IA	Y	N	Y	Y	Y	Y	Y	N	Y	N	Y	Y
ID	N	N	N	N	N	N	N	N	Y	-	Y	N
IL	N	N	N	N	N	Y	Y	Y	Y	N	Y	Y
IN	N	N	N	N	N	Y	N	N	N	Y	N	N
KS	N	N	N	N	N	Y	N	N	N	N	Y	N
KY	N	N	N	N	N	N	N	N	N	N	N	N
LA	N	N	N	N	N	N	N	N	N	Y	Y	N
MA	N	N	N	N	N	N	Y	Y	N	Y	Y	Y
MD	N	N	N	N	N	N	Y	Y	Y	N	Y	Y
ME	N	N	N	N	Y	Y	N	N	Y	Y	N	Y
MI	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	N
MN	Y	N	Y	Y	Y	Y	N	N	Y	N	Y	Y
MO	N	N	N	Y	N	N	N	N	N	Y	Y	N
MS	N	N	N	N	N	N	N	N	N	N	N	N
MT	N	Y	N	Y	N	Y	N	N	Y	Y	N	N
NC	Y	N	Y	Y	Y	Y	N	N	N	Y	N	N
NE	N	N	N	Y	N	Y	Y	N	N	Y	Y	Y
NJ	N	Y	N	N	N	Y	N	Y	N	N	N	Y
NM	N	N	N	N	N	N	Y	Y	N	N	Y	Y
NV	Y	Y	N	Y	Y	N	N	Y	Y	Y	N	N
NY	N	N	N	N	N	N	N	N	N	N	N	Y
OH	Y	N	Y	Y	Y	Y	Y	N	N	Y	Y	N
OK	N	N	N	N	N	N	N	N	N	Y	N	N
OR	N	Y	N	N	N	N	N	Y	N	N	Y	Y
PA	Y	N	Y	Y	Y	Y	N	N	N	Y	N	N
RI	N	N	N	N	N	Y	Y	Y	N	N	Y	Y
SC	N	N	N	Y	N	N	N	N	N	N	N	N
SD	N	N	N	N	N	Y	N	N	N	N	Y	N
TN	N	N	N	N	N	Y	N	N	N	Y	N	N
TX	Y	N	N	Y	Y	N	N	N	N	Y	Y	N
UT	N	Y	N	Y	N	N	N	N	Y	N	Y	Y
VA	N	N	N	N	N	Y	N	Y	Y	Y	N	Y
VT	N	Y	N	N	N	Y	N	Y	Y	Y	N	Y
WA	N	Y	N	N	N	N	N	Y	Y	N	N	Y
WI	Y	N	Y	Y	Y	N	Y	N	Y	N	Y	Y
WV	N	N	N	N	N	N	N	Y	N	Y	N	N
WY	N	N	N	N	N	Y	N	N	Y	Y	N	N

Note: This table lists state election characteristics (Y=yes and N=no) in the 2020 presidential election for states in our sample. See note to Tables 2, A3, and A6 for definitions of characteristics.

Table A3: ROBUSTNESS: ALTERNATIVE DEFINITIONS OF SWING AND STATE SUBSETS

	(1)	(2)	(3)	(4)	(5)
	Dependent var.: Vote in first state of registration				
	Swing NYT	Swing ex-ante	Swing ex-post	Drop Goel et al. (2020) states	Drop non-NVRA states
Only first swing	5.632*** (0.785)	4.552*** (0.839)	4.726*** (0.794)	5.242*** (0.820)	4.979*** (0.808)
Both swing	3.283*** (1.071)	1.346 (0.848)	1.439 (0.897)	1.752* (0.940)	1.630* (0.939)
Only second swing	-0.437 (0.668)	-1.958*** (0.744)	-1.896*** (0.680)	-1.873*** (0.698)	-1.925*** (0.683)
Only first auto-mailed ballot	2.122** (0.857)	1.914** (0.850)	1.933** (0.845)	1.787** (0.874)	1.903** (0.857)
Both auto-mailed ballot	3.342* (1.967)	1.813 (2.000)	1.941 (2.033)	1.892 (2.127)	1.867 (2.043)
Only second auto-mailed ballot	-2.043*** (0.662)	-3.054*** (0.654)	-2.984*** (0.632)	-3.105*** (0.644)	-3.053*** (0.636)
Observations	583,835	583,835	583,835	558,627	570,629
R^2	0.007	0.007	0.007	0.008	0.007
Outcome mean (%)	9.77	9.77	9.77	9.74	9.82

Note: This table reports robustness tests for Table 2. All independent variables are defined in the same way as in Table 2 except for those related to swing in columns 1-3. Column 1 defines swing states as those listed by the New York Times (2020); column 2 uses statewide opinion polling aggregated by FiveThirtyEight (2020), classifying swing states as those with an expected vote margin within 10 percentage points (pp); column 3 classifies swing states as those whose actual vote margin in the 2020 election was within 10 pp (MIT Election Data and Science Lab, 2020). Column 4 excludes states identified by Goel et al. (2020) as having potentially lower data quality in the 2012 presidential election due to multi-generational households. Column 5 excludes states exempt from the NVRA: Idaho, Minnesota, Wyoming, and Wisconsin (North Dakota and New Hampshire are already excluded because they do not provide information on registration date). Standard errors in parentheses are clustered at the state-pair level.

*** 1%, ** 5%, * 10% significance level

Table A4: HETEROGENEITY BY INCOME AND AGE

	Dependent var.: Vote in first state of registration			
	Low income	High income	Age 18-64	Age 65-99
Only first swing	4.193*** (0.937)	5.021*** (0.708)	4.348*** (0.728)	6.941*** (1.547)
Both swing	0.948 (0.921)	1.719* (0.905)	1.243 (0.915)	1.386 (1.014)
Only second swing	-2.331*** (0.773)	-1.584*** (0.571)	-1.751*** (0.677)	-3.381*** (0.987)
Only first auto-mailed ballot	1.692* (1.018)	2.369*** (0.684)	1.915** (0.922)	2.103*** (0.706)
Both auto-mailed ballot	2.489 (2.720)	2.044 (1.560)	1.555 (1.816)	4.680 (3.936)
Only second auto-mailed ballot	-2.399*** (0.727)	-2.604*** (0.579)	-3.109*** (0.589)	-0.543 (1.434)
Observations	290,104	290,260	502,877	80,958
R^2	0.006	0.008	0.006	0.014
Outcome mean	10.78	8.62	9.47	11.6
Mean age	45.7	43.67	40.15	72.82

Note: This table reports heterogeneity analyses by income and age using the same specification as Table 2 column 1. Columns 1 and 2 split our double-registrant sample into those registering in counties with above vs. below median zipcode-level adjusted gross income in 2020 (from Individual Income Tax Statistics). Columns 3 and 4 split the sample into individuals below vs. above age 65. Standard errors in parentheses are clustered at the state-pair level.

*** 1%, ** 5%, * 10% significance level

Table A5: HETEROGENEITY BY PARTY

	Dep. var.: Vote in first state of registration		
	(1) Democrat	(2) Republican	(3) Independent
Only first swing	4.319*** (0.697)	4.961*** (1.234)	4.915*** (0.966)
Both swing	1.766* (0.984)	0.574 (1.380)	1.464* (0.872)
Only second swing	-1.416** (0.715)	-2.911*** (0.959)	-1.839** (0.767)
Only first auto-mailed ballot	1.471 (1.010)	2.370*** (0.841)	2.337*** (0.811)
Both auto-mailed ballot	0.572 (1.711)	4.668* (2.396)	2.551 (2.413)
Only second auto-mailed ballot	-3.454*** (0.559)	-1.103 (1.144)	-2.855*** (0.778)
Observations	273,859	126,316	183,660
R^2	0.006	0.010	0.007
Outcome mean (%)	9.07	9.72	10.84

Note: This table reports heterogeneity analyses by party affiliation using the same specification as Table 2 column 1. Columns 1, 2, and 3 consist of registered Democrats, Republicans, and Independents, respectively. Party affiliation is based on an individual's second state of registration. Standard errors in parentheses are clustered at the state-pair level.

*** 1%, ** 5%, * 10% significance level

Table A6: ROBUSTNESS: ADDITIONAL STATE CONTROLS

	Dependent var.: Vote in first state of registration								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Only first swing	4.576*** (0.761)	4.544*** (0.808)	4.531*** (0.831)	4.635*** (0.771)	3.528*** (0.867)	4.656*** (0.783)	4.742*** (0.793)	3.083*** (0.927)	3.345*** (0.820)
Both swing	1.169 (0.758)	1.402 (0.881)	1.073 (0.906)	1.143 (0.883)	1.197* (0.715)	1.545** (0.767)	1.437 (0.902)	0.253 (1.049)	0.448 (0.791)
Only second swing	-1.852*** (0.604)	-1.808*** (0.696)	-2.178*** (0.692)	-2.145*** (0.685)	-1.380** (0.624)	-2.049*** (0.656)	-1.906*** (0.687)	-2.260*** (0.784)	-2.231*** (0.685)
Only first auto-mailed ballot	2.658*** (0.786)	1.538* (0.868)	2.221*** (0.836)	2.245*** (0.847)	2.526*** (0.882)	2.172*** (0.688)	1.916** (0.843)	2.491*** (0.824)	3.057*** (1.062)
Both auto-mailed ballot	3.079 (2.033)	1.756 (2.037)	2.962 (1.928)	3.768 (2.495)	1.600 (2.111)	2.565 (2.033)	1.713 (2.081)	2.506 (2.048)	5.496** (2.468)
Only second auto-mailed ballot	-2.655*** (0.667)	-2.822*** (0.663)	-2.513*** (0.836)	-2.225** (0.988)	-3.688*** (0.657)	-2.877*** (0.666)	-3.012*** (0.643)	-2.797*** (0.588)	-0.280 (0.953)
Observations	583,835	583,835	583,835	583,835	581,624	583,835	583,835	583,835	581,624
R^2	0.008	0.007	0.007	0.007	0.011	0.008	0.007	0.008	0.015
Outcome mean (%)	9.77	9.77	9.77	9.77	9.76	9.77	9.77	9.77	9.76
Early voting controls	Y	N	N	N	N	N	N	N	Y
Auto absentee app. controls	N	Y	N	N	N	N	N	N	Y
Auto voter reg. controls	N	N	Y	N	N	N	N	N	Y
Election-day reg. controls	N	N	N	Y	N	N	N	N	Y
EAVS removal rate controls	N	N	N	N	Y	N	N	N	Y
State reg. date controls	N	N	N	N	N	Y	N	N	Y
Migration flow controls	N	N	N	N	N	N	Y	N	Y
Tax controls	N	N	N	N	N	N	N	Y	Y

Note: This table reports robustness results for Table 2 column 1 by adding state-pair level controls. For all columns except column 7, we implement this by including indicators for whether only the first state equals 1 (e.g., *Only first early voting*), for whether only the second state equals 1 (e.g., *Only second early voting*), or both (e.g., *Both early voting*). Column 1 controls for state early voting status, defined as allowing voting at least 19 days before the election (the median). Columns 2, 3, and 4 control for automatic mailing of absentee ballot applications, automatic voter registration, and election-day registration, respectively. Column 5 controls for whether a state has an above-median (6.7%) voter removal rate using the 2020 Election Administration and Voting Survey (EAVS); the removal rate is calculated as the total number of voters removed from the voter registration rolls between the 2018 and the 2020 general elections, divided by the sum of the number removed plus the number remaining. Column 6 controls for whether a state has an above-median (20.3%) likelihood that the state registration date differs from the date in L2. Column 7 includes 2018-2019 state-pair level migration flows from the first to the second state per 1,000 state residents using data from the IRS Statistics of Income. Column 8 controls for whether a state has an above-median (10.8%) 2020 tax burden, as defined by the Tax Foundation, 2020. Column 9 includes all controls in the prior columns. Standard errors in parentheses are clustered at the state-pair level.

*** 1%, ** 5%, * 10% significance level

Table A7: ROBUSTNESS: STATE AND UNORDERED STATE PAIR FIXED EFFECTS

	Dependent var.: Vote in first state of registration			
	(1) Baseline	(2) State FE	(3) State-pair FE Incentive CSSV	(4) State-pair FE Cost CSSV
Only first swing	4.719*** (0.794)	3.884*** (0.519)		
Both swing	1.421 (0.901)			
Only second swing	-1.889*** (0.678)	-2.686*** (0.366)		
Only first auto-mailed ballot	1.919** (0.844)	1.819*** (0.690)		
Both auto-mailed ballot	1.932 (2.032)			
Only second auto-mailed ballot	-2.983*** (0.632)	-2.954*** (0.665)		
Only 1st swing – Only 2nd swing			5.529*** (0.839)	
Only 1st auto-mailed – Only 2nd auto-mailed				1.184 (0.972)
Observations	583,835	583,835	583,835	583,835
R^2	0.007	0.015	0.021	0.017
Outcome mean (%)	9.77	9.77	9.77	9.77

Note: Column 1 repeats the main specification in Table 2; column 2 includes 49 dummies, one for each state if it appears in a voter's state pair; columns 3 and 4 include unordered state pair fixed effects. Note that due to multicollinearity, we cannot identify *Both swing* or *Both auto-mailed* in column 2, and we can only identify a single coefficient in columns 3 and 4. Standard errors in parentheses are clustered at the state-pair level.

*** 1%, ** 5%, * 10% significance level

Table A8: ROBUSTNESS: EXCLUDE DOUBLE REGISTRANTS IN STATES WITH AUTO-MAILED BALLOTS

	Dependent var.: Vote in first state of registration		
	(1)	(2)	(3)
	All double-registrants	Near certain general election voters	
		Voter in primary	Predicted voter Pr $\geq$ 0.99
Only first swing	5.010*** (1.032)	7.545*** (1.325)	11.354*** (1.842)
Both swing	1.381 (1.056)	1.402 (1.442)	2.454* (1.305)
Only second swing	-2.263*** (0.814)	-4.527*** (1.151)	-4.449*** (1.194)
Observations	366,823	90,079	37,255
R^2	0.008	0.018	0.028
Outcome mean (%)	9.91	12.44	12.23

Note: This table replicates Table 2 while excluding double registrants where either registration is in a state that auto mails ballots. Everything else follows Table 2. Standard errors in parentheses are clustered at the state-pair level.

*** 1%, ** 5%, * 10% significance level

APPENDIX B. DETAILS ON QUANTIFYING CSSV’S EFFECT ON THE 2020 ELECTION

This appendix provides details on the back-of-the-envelope calculations underlying Table B1, which aims to quantify the effects of CSSV on the 2020 election. This calculation requires several assumptions, including extrapolating estimates from our regression sample to the broader voter population and inferring voting behavior from party affiliation. Columns 1 and 2 of Table B1 report the total number of CSSV votes flowing in and out of each of the 13 swing states. We do this by estimating the number of double-registrants using the same strategy as in Section 3, calculating the number of votes that flow in and out of each pair of states using our estimated CSSV coefficients, and summing the inflows and outflows for each swing state. To put these numbers in perspective, column 3 lists the actual vote margins in the 2020 election.

Whether CSSV behavior affected the outcome of an election depends not only on how many CSSV-induced votes occur, but also on whether one party engaged in it more than the other in swing states. The overall effect depends on (i) the share of Democrats vs. Republicans among double-registrants and their distribution across states and (ii) the intensity of CSSV behavior among Democrats vs. Republicans. Ultimately, what matters is the party composition of both inflows and outflows in swing states. The calculated inflows and outflows in columns 1 and 2 use party-specific estimates for the number of double-registrants in each state and for the CSSV coefficients.

In Section 2 we showed that there are approximately twice as many Democratic as Republican double-registrants. Appendix Table A5 runs the regression from Table 2 column 1 separately for Democrats, Republicans, and Independents. While voters from all parties display CSSV behavior, an F-test confirms that the coefficients are different (p value < 0.01). There is some evidence that Republicans are more responsive to incentives than Democrats.

The remaining columns in Appendix Table B1 estimate the number of votes gained or lost by each party’s candidate and the net effect. To translate party affiliation into votes for each candidate, we use exit polls (Schaffner et al., 2021). Aggregating these incentive effects across all state pairs, we report the net number of votes flowing into each swing state for the

candidates in columns 4-5 and the difference between them (Dem–Rep) in column 6.

For example, in Georgia, the Democratic candidate (Biden) gained 2,339 votes due to incentive-based CSSV, while the Republican candidate (Trump) gained 1,682, for a net difference of +657, which means Biden gained more incentive-based CSSV votes. In contrast, the net difference for cost-based CSSV is -296, which means Trump gained more cost-based CSSV votes. Combining the two effects, CSSV added only 360 votes in favor of Trump in Georgia on net, despite there being 7,426 ($=5,444 + 1,982$) total CSSV-induced votes.

The patterns observed in Georgia are present more generally across the other swing states, none of which had auto-mailed ballots except Nevada.¹ First, incentive-based CSSV generally favored Biden because of the larger number of Democratic double-registrants. Second, cost-based CSSV generally favored Trump by disproportionately pulling votes away from Biden in swing states because more Democrats reside in auto-mail states. In summary, there were a sizable number of CSSV votes in 2020 – 107,000 of which involve at least one swing state – but the *net* effect was small, because Republican and Democratic CSSV-induced votes largely canceled out.

¹Given the estimated impacts, by construction cost-based CSSV effects in swing states are negative (except for Nevada) because none of them are auto-mail states.

Table B1: QUANTIFYING CSSV’S EFFECT ON THE 2020 ELECTION

	CSSV induced votes		Actual 2020 vote margin	Estimated 2020 vote gain for Democratic and Republican presidential candidates						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
				<i>Incentive</i>			<i>Cost</i>			<i>Total</i>
	Inflow	Outflow	Win-Loss	Dem	Rep	Dem-Rep	Dem	Rep	Dem-Rep	Dem-Rep
AZ	2,944	1,637	10,457	1,283	1,225	58	-722	-533	-190	-131
GA	5,444	1,982	11,779	2,339	1,682	657	-493	-196	-296	360
WI	2,873	709	20,682	1,443	1,118	325	-341	-152	-189	136
NV	5,653	1,347	33,596	1,474	1,384	90	924	299	626	715
NC	4,162	1,075	74,481	1,835	1,645	191	-314	-188	-126	65
PA	13,405	4,100	80,555	7,563	4,790	2,773	-2,322	-1,061	-1,261	1,512
IA	2,397	551	138,611	1,176	940	236	-235	-124	-112	124
MI	2,828	830	154,188	1,397	947	450	-342	-127	-215	236
MN	613	327	233,012	196	199	-4	-83	-40	-42	-46
FL	25,265	6,238	371,686	11,542	10,928	614	-2,515	-1,601	-914	-300
OH	6,998	1,695	475,669	3,180	2,475	705	-589	-244	-345	360
TX	17,082	5,943	631,221	7,699	7,068	632	-2,615	-1,488	-1,127	-495

Note: This table performs a back-of-the-envelope calculation quantifying CSSV effects in swing states. It uses (i) estimates of the number of double-registrants by party for each ordered state pair, (ii) estimates of the party-specific CSSV coefficients from Table A5, and (iii) exit polls for how party affiliation translates into votes for a candidate (Schaffner et al., 2021). As an example, we first estimate that there are 5,440 (Florida, New York) Republican double-registrants, 22,164 (Florida, New York) Democrats, and 10,933 (Florida, New York) Independents using the procedure in Section 3. Second, we combine these numbers with the CSSV coefficients from Table A5 to calculate the number of votes that flow in and out of this ordered state pair. Since the first state (Florida) is the only swing state in the pair, we calculate 270 ($= 5,440 \times 4.961/100$) votes from Republican double-registrants, 957 votes from Democrats, and 161 votes from Independents flowed out of New York and into Florida. Third, exit polls in New York indicate that 87.5% of Republicans voted for Trump and 11.5% for Biden, so the 270 incentive-driven votes among (Florida, New York) Republican double-registrants led to a 236 vote gain for Trump and 31 vote gain for Biden in Florida, with the same votes lost in New York. A similar calculation using exit-poll data yields vote flows for Democratic and Independent double-registrants. The table performs these calculations for CSSV-induced votes for all ordered state-pairs and aggregates them. Columns 4 to 6 report the party-specific net inflow minus outflow for incentive-based CSSV; columns 7 to 9 do this for cost-based CSSV. Column 10 sums columns 6 and 9.