Online Appendix Table 1 — E-cigarette MLSA Law and Youth Substance Use
National and State YRBSS: 2005-2015 (Strongly Balanced Sample)

Panel A	DV: Youth is a current smoker			DV: Youth is a first-time smoker		
	1	2	3	4	5	6
E-cigarette MLSA Law	0.010**	0.014**	0.017***	0.006**	0.007**	0.008***
	(0.004)	(0.006)	(0.005)	(0.003)	(0.004)	(0.003)
N	625,719	625,719	625,719	455,908	455,908	455,908

Panel B	DV: Youth is a regular smoker			DV: Youth is a heavy smoker		
	1	2	3	4	5	6
E-cigarette MLSA Law	0.008*	0.011**	0.009***	0.008**	0.011***	0.009***
	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)
N	625,719	625,719	625,719	625,719	625,719	625,719

Panel C	DV: Youth is a current drinker			DV: Youth is a binge drinker		
	1	2	3	4	5	6
E-cigarette MLSA Law	-0.002	0.003	0.009	0.002	-0.003	-0.001
	(0.009)	(0.010)	(0.010)	(0.007)	(0.006)	(0.006)
N	589,491	589,491	589,491	589,491	589,491	589,491

| Panel D	DV: Youth is a marijuana user					
	1	2	3			
E-cigarette MLSA Law	0.002	-0.005	0.000			
	(0.009)	(0.010)	(0.010)			
N	632,304	632,304	632,304			
Full Controls	✓	✓	✓	✓	✓	✓
State FEs	✓	✓	✓	✓	✓	✓
Year FEs	✓	✓	✓	✓	✓	✓
State-specific linear pre-trends		✓			✓	
State-specific linear trends			✓			✓

Notes: Standard errors, clustered at the state level, are shown in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
All models include dummy variables for gender, race, age, and grade levels. State-level covariates listed in Table 1 are included.
E-cigarette MLSA law, the leads, and the lags are defined in the text.
The definitions of youth substance use are in the text.

Online Figure 1 – Youth Substance Use Rates Between E-cigarette MLSA States and Synthetic Control States
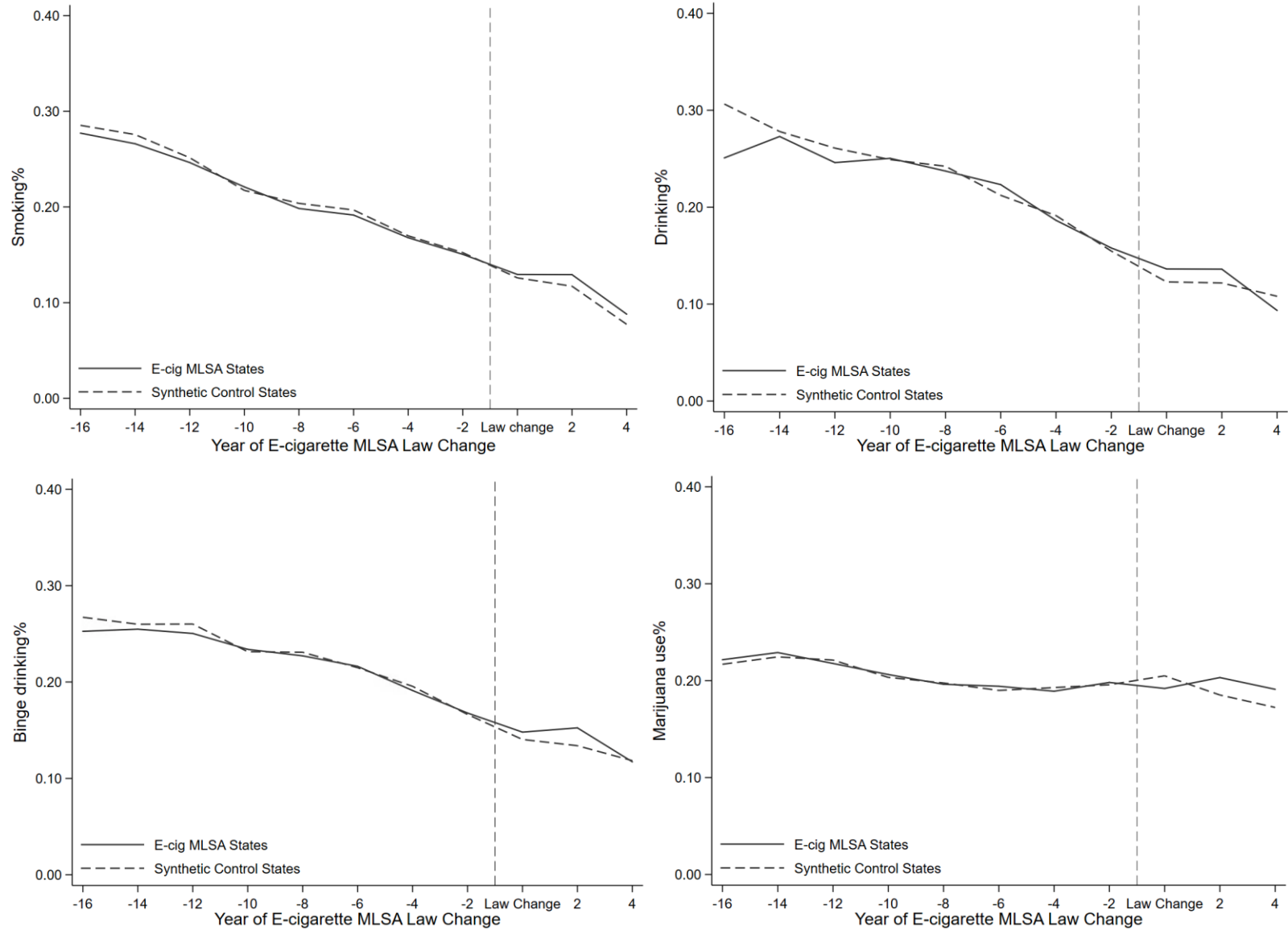
Notes: as in Figure 1, the *x*-axis indicates the survey year relative to the year of e-cigarette MLSA law change. The graph plots the mean youth substance use rates between the MLSA and synthetic control states after netting out the state fixed effects. For scaling purposes, we added the mean substance use rate calculated over the pooled SCM-weighted sample to each adjusted substance use rate (adjusted for state fixed effects). Sample statistics are weighted by the total underage population.

Online Appendix Table 2 — E-cigarette MLSA Law and Youth Substance Use
SCM-weighted Sample

	Current Smoker	Current Drinker	Current Binge Drinker	Current Marijuana User
E-cigarette MLSA Law	0.010*	0.008	0.008	-0.004
	(0.005)	(0.009)	(0.006)	(0.009)
State FEs	✓	✓	✓	✓
N	245	245	245	245

Notes: Standard errors, calculated using Donald and Lang's (2007) two-step estimator, are shown in parentheses.
* $p < 0.10$
We run SCM on each MLSA state by excluding all the other MLSA states from the estimation sample. We then pool these individually created synthetic samples, thereby forming one larger SCM-weighted sample, and keep the synthetic weights unchanged. Lastly, we regress the difference of youth substance use rates between the MLSA states and synthetic control states on an indicator variable for the enactment of e-cigarette MLSA laws and control for a set of state dummy variables.
Youth aged 18 or above are excluded from creating such SCM-weighted sample.

Online Appendix Table 3 — Falsification Tests
National and State YRBSS: 2005-2015

Panel A

DV: Youth is a current smoker	1	2	3
E-cigarette MLSA Law	0.012	-0.006	-0.001
	(0.013)	(0.011)	(0.014)
Mean of dep. var. in the control states	0.23	0.23	0.23
N	93,716	93,716	93,716

Panel B

DV: Youth is a current drinker	1	2	3
E-cigarette MLSA Law	-0.008	-0.011	-0.013
	(0.018)	(0.024)	(0.019)
Mean of dep. var. in the control states	0.47	0.47	0.47
N	88,992	88,992	88,992

Panel C

DV: Youth is a current binge drinker	1	2	3
E-cigarette MLSA Law	-0.009	0.003	-0.002
	(0.014)	(0.012)	(0.009)
Mean of dep. var. in the control states	0.31	0.31	0.31
N	88,992	88,992	88,992

Panel D

DV: Youth is a current marijuana user	1	2	3
E-cigarette MLSA Law	-0.006	-0.019	-0.009
	(0.015)	(0.013)	(0.015)
Mean of dep. var. in the control states	0.26	0.26	0.26
N	95,906	95,906	95,906
Full Controls	✓	✓	✓
State FEs	✓	✓	✓
Year FEs	✓	✓	✓
State-specific linear pre-trends		✓	
State-specific linear trends			✓

Notes: Standard errors, clustered at the state level, are shown in parentheses.
All models include dummy variables for gender, race, age, and grade levels. State-level covariates listed in Table 1 are included.
Definitions of current smokers, drinkers, binge drinkers, and marijuana users are in the text.
E-cigarette MLSA Law is defined in the text.
Sample is restricted to youth who have aged out of the e-cigarette MLSA laws and were not exposed to the laws while underage.

Online Appendix Table 4 — E-cigarette MLSA Law and Youth Smoking; Stratified by Gender
National and State YRBSS: 2005-2015

DV: Youth is a current smoker	Boys			Girls		
Panel A	1	2	3	4	5	6
E-cigarette MLSA Law	0.013**	0.016**	0.019***	0.006	0.008	0.012**
	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
Panel B	1	2	3	4	5	6
E-cigarette MLSA ≤2 Waves Pre	-0.001	-0.003	-0.006	-0.003	-0.005	-0.007
	(0.005)	(0.007)	(0.005)	(0.004)	(0.005)	(0.004)
E-cigarette MLSA 1 Wave Pre (Ref.)	–	–	–	–	–	–
E-cigarette MLSA Wave of Implementation	0.013**	0.019**	0.023***	0.006	0.011*	0.014***
	(0.006)	(0.008)	(0.007)	(0.005)	(0.007)	(0.005)
E-cigarette MLSA ≥1 Wave Post	0.027**	0.045***	0.032*	0.018***	0.018*	0.013
	(0.011)	(0.016)	(0.017)	(0.006)	(0.010)	(0.010)
Full Controls	✓	✓	✓	✓	✓	✓
State FEs	✓	✓	✓	✓	✓	✓
Year FEs	✓	✓	✓	✓	✓	✓
State-specific linear pre-trends		✓			✓	
State-specific linear trends			✓			✓
Mean of dep. var. in the control states	0.16	0.16	0.16	0.14	0.14	0.14
Observations	359,044	359,044	359,044	393,288	393,288	393,288

Notes: Standard errors, clustered at the state level, are shown in parentheses.
* p < 0.10, ** p < 0.05, *** p < 0.01
All models include dummy variables for race, age, and grade levels. State-level covariates listed in Table 1 are included.
We define youth as current smokers if any days of smoking over the past month are reported. The analysis sample is restricted to youth younger than 18.
E-cigarette MLSA Law, the leads, and the lags are defined in the text. One wave means one survey year.

Online Appendix Table 5 — E-cigarette MLSA Law and Youth Smoking; Stratified by Grade
National and State YRBSS: 2005-2015

DV: Youth is a current smoker	9 & 10th graders			11 & 12th graders		
Panel A	1	2	3	4	5	6
E-cigarette MLSA Law	0.012**	0.014	0.016**	0.008*	0.016*	0.018***
	(0.005)	(0.009)	(0.007)	(0.005)	(0.009)	(0.005)
Panel B	1	2	3	4	5	6
E-cigarette MLSA ≤2 Waves Pre	-0.003	0.003	-0.001	-0.011	-0.016	-0.017*
	(0.005)	(0.009)	(0.006)	(0.008)	(0.011)	(0.007)
E-cigarette MLSA 1 Wave Pre (Ref.)	–	–	–	–	–	–
E-cigarette MLSA Wave of Implementation	0.012**	0.012	0.016**	0.007*	0.024**	0.025***
	(0.005)	(0.012)	(0.008)	(0.004)	(0.011)	(0.008)
E-cigarette MLSA ≥1 Wave Post	0.022***	0.021	0.016	0.018***	0.036	0.046*
	(0.007)	(0.016)	(0.016)	(0.005)	(0.022)	(0.024)
Full Controls	✓	✓	✓	✓	✓	✓
State FEs	✓	✓	✓	✓	✓	✓
Year FEs	✓	✓	✓	✓	✓	✓
State-specific linear pre-trends		✓			✓	
State-specific linear trends			✓			✓
Mean of dep. var. in the control states	0.12	0.12	0.12	0.16	0.16	0.16
Observations	461,560	461,560	461,560	290,772	290,772	290,772

Notes: Standard errors, clustered at the state level, are shown in parentheses.
* p < 0.10, ** p < 0.05, *** p < 0.01
All models include dummy variables for gender, race, age, and grade levels. State-level covariates listed in Table 1 are included.
We define youth as current smokers if any days of smoking is reported in the past month. The analysis sample is restricted to youth younger than 18.
E-cigarette MLSA Law, the leads, and the lags are defined in the text. One wave means one survey year

Online Appendix Table 6 — National and State YRBSS State by Year Observation Counts

State	2005	2007	2009	2011	2013	2015
Alabama	1,026	483	2,528	1,654	1,845	1,810
Alaska		1,268	1,218	1,279	1,183	1,343
Arizona	3,502	3,545	2,846	3,876	1,744	2,698
Arkansas	1,503	1,979	1,927	1,327	1,802	2,746
California	1,553	2,110	2,802	1,877	2,463	5,779
Colorado	1,475		1,684	1,721	304	270
Connecticut	2,442	1,997	2,319	2,000	2,377	2,429
Delaware	2,633	2,357	2,257	2,421	2,590	2,638
District of Columbia				316		
Florida	4,982	5,098	5,591	7,409	6,840	6,854
Georgia	3,579	2,744	3,146	2,033	2,278	402
Hawaii	1,627	1,148	1,692	4,172	4,467	
Idaho	1,667	1,384	2,102	1,921	2,090	2,050
Illinois	492	2,956	4,432	4,500	3,793	4,022
Indiana	1,682	2,653	1,473	3,062	824	2,057
Iowa	1,588	1,666		1,513		
Kansas	1,909	1,692	2,196	2,133	2,089	
Kentucky	3,766	3,842	1,726	1,973	2,257	2,465
Louisiana	158	1,299	1,437	1,115	1,063	
Maine	1,325	1,267	8,445	9,079	8,343	9,112
Maryland	1,398	1,486	1,590	2,793	51,769	54,356
Massachusetts	3,598	3,745	2,624	2,915	2,630	3,238
Michigan	3,479	3,723	3,636	4,711	4,627	4,879
Minnesota	95		188		292	745
Mississippi		1,923	1,763	1,846	2,144	2,040
Missouri	1,963	1,865	1,681	344	1,825	1,594
Montana	2,987	3,846	1,785	4,022	4,745	4,308
Nebraska	3,706			3,719	1,824	1,634
Nevada	1,529	1,729	2,403	207	2,069	1,787
New Hampshire	1,249	1,581	1,450	1,359	1,590	14,310
New Jersey	1,800	689	2,203	1,730	2,027	208
New Mexico	5,417	2,780	5,495	5,685	5,325	8,486
New York	9,939	13,688	15,335	13,161	10,409	10,406
North Carolina	4,466	3,975	5,550	3,324	2,171	5,891
North Dakota	1,710	1,722	1,767	1,863	1,919	2,064
Ohio	1,663	2,433		1,358	1,578	227
Oklahoma	1,923	2,842	1,397	1,136	1,465	1,934
Oregon	268		247			
Pennsylvania	423	210	3,104	450	264	3,278
Rhode Island	2,316	2,133	3,106	3,814	2,357	4,004
South Carolina	1,567	1,206	1,070	1,437	1,553	1,311

South Dakota	1,567	1,577	2,122	1,502	1,273	1,257
Tennessee	1,924	2,182	2,176	2,874	1,847	4,371
Texas	5,821	4,906	4,766	5,841	3,479	1,226
Utah	1,710	2,097	1,544	1,657	2,118	
Vermont	6,997	5,744	8,190	8,267		20,151
Virginia	349	439	98	1,603	7,776	4,310
Washington	101		246	167	195	102
West Virginia	1,549	1,598	2,071	2,375	1,753	1,803
Wisconsin	2,593	2,234	3,074	3,615	2,776	
Wyoming	2,455	2,174	2,802	2,439	2,924	2,317

Online Appendix Table 7 — National and State YRBSS State by Year Observation Counts (Strongly Balanced Sample)

State	2005	2007	2009	2011	2013	2015
Alabama	1,026	483	2,528	1,654	1,845	1,810
Arizona	3,502	3,545	2,846	3,876	1,744	2,698
Arkansas	1,503	1,979	1,927	1,327	1,802	2,746
California	1,553	2,110	2,802	1,877	2,463	5,779
Connecticut	2,442	1,997	2,319	2,000	2,377	2,429
Delaware	2,633	2,357	2,257	2,421	2,590	2,638
Florida	4,982	5,098	5,591	7,409	6,840	6,854
Georgia	3,579	2,744	3,146	2,033	2,278	402
Idaho	1,667	1,384	2,102	1,921	2,090	2,050
Illinois	492	2,956	4,432	4,500	3,793	4,022
Indiana	1,682	2,653	1,473	3,062	824	2,057
Kentucky	3,766	3,842	1,726	1,973	2,257	2,465
Maine	1,325	1,267	8,445	9,079	8,343	9,112
Maryland	1,398	1,486	1,590	2,793	51,769	54,356
Massachusetts	3,598	3,745	2,624	2,915	2,630	3,238
Michigan	3,479	3,723	3,636	4,711	4,627	4,879
Missouri	1,963	1,865	1,681	344	1,825	1,594
Montana	2,987	3,846	1,785	4,022	4,745	4,308
Nevada	1,529	1,729	2,403	207	2,069	1,787
New Hampshire	1,249	1,581	1,450	1,359	1,590	14,310
New Jersey	1,800	689	2,203	1,730	2,027	208
New Mexico	5,417	2,780	5,495	5,685	5,325	8,486
New York	9,939	13,688	15,335	13,161	10,409	10,406
North Carolina	4,466	3,975	5,550	3,324	2,171	5,891
North Dakota	1,710	1,722	1,767	1,863	1,919	2,064
Oklahoma	1,923	2,842	1,397	1,136	1,465	1,934
Pennsylvania	423	210	3,104	450	264	3,278
Rhode Island	2,316	2,133	3,106	3,814	2,357	4,004
South Carolina	1,567	1,206	1,070	1,437	1,553	1,311
South Dakota	1,567	1,577	2,122	1,502	1,273	1,257
Tennessee	1,924	2,182	2,176	2,874	1,847	4,371
Texas	5,821	4,906	4,766	5,841	3,479	1,226
Virginia	349	439	98	1,603	7,776	4,310
West Virginia	1,549	1,598	2,071	2,375	1,753	1,803
Wyoming	2,455	2,174	2,802	2,439	2,924	2,317

Online Data Appendix

Our analysis sample uses data from the pooled national and state YRBSS, spanning 2005-2015. The national YRBSS is conducted by CDC and the state YRBSS, while coordinated by CDC, is administered by each state health department or education agency. By default, the national YRBSS does not provide state identifiers, but we have obtained this information from CDC. States that have administered YRBSS may not distribute data for secondary analyses when response rates are low, and we do not include these data in analyses. Although we have only three waves (5 years) of post-policy data given the biennial structure of the YRBSS, there is sufficient variation in the observed exposure to e-cigarette MLSA laws within states over time, which we exploit to identify the policy effects. Online Appendix Tables 6 and 7 display the number of observations at each state by year cell from the pooled national and state YRBSS.

For dependent variables, we use a battery of questions relating to youth risky behaviors such as smoking, drinking, and other substance use is consistently available in each wave of the YRBSS. We define dichotomous indicators for past month participation in smoking, alcohol consumption, binge drinking (consuming 5 or more drinks of alcohol in a row), and marijuana use. We also define an indicator for smoking initiation based on youth current age and the age they reported smoking a full cigarette for the first time; this indicator captures whether the respondent initiated smoking in a given wave if their current age matches their reported age of smoking onset.

For time-varying control variables, we control for an extensive set of confounding policy shifts over this period: federal and state cigarette excise taxes, state beer taxes, medical marijuana laws (MMLs), marijuana decriminalization laws, state unemployment rates, and the natural logarithm of state per capita income. To proxy for anti-smoking sentiment, we control for the presence of comprehensive smoke-free air laws covering four venues: government and private worksites, restaurants, and bars. We also account for anti-vaping sentiment by using an indicator variable for whether vaping in private workplaces is restricted. No partial bans on vaping in private workplaces exist.

We do not use e-cigarette taxes as a control because only Minnesota has levied taxes on e-cigarettes over the study period. Lastly, we control for a set of underage drinking regulations, ranging from zero-tolerance laws to laws related to alcohol possession, alcohol consumption, alcohol purchase, license suspension, parties involving underage drinking, and keg registration, to account for the social norm against underage drinking. These data come from the Alcohol Policy Information System.

Our control for medical marijuana laws follow Choi, Dave, and Sabia (2016) by creating a set of indicator variables tracking the law's overall legislative decision and its separate statutes related to home cultivation, legal dispensaries, allowance for non-specific pain, and state registry. Home cultivation allows qualified patients and their caregivers to grow cannabis plants at home. Legal dispensaries offer protection to legal marijuana supply through retail dispensaries. Allowance for non-specific pain relaxes the constraint that medical marijuana is reserved for particular medical symptoms. And state registry requires medical marijuana users to register with a state or local authority.

The cigarette tax data come from the CDC STATE System and the beer tax data come from the National Institute on Alcohol Abuse and Alcoholism. We use tax rates as of March for both variables to match the study period over which surveys were conducted. We obtain state unemployment rates and per capita income from the Bureau of Labor Statistics. Both cigarette and beer taxes are inflation-adjusted to 2005 dollars using the Consumer Price Index for All Urban Consumers (CPI-U), and we transform the per capita income using a natural logarithm.

Reference:

Choi, Anna, Dhaval Dave, and Joseph J. Sabia. *Smoke gets in your eyes: Medical marijuana laws and tobacco use*. No. w22554. National Bureau of Economic Research, 2016.