## Appendix

Table A1: Changes in Average 4-Week Period E-Cigarette Unit Sales ${ }^{1}$ in Massachusetts and New York Following Flavored E-Cigarette Restrictions ${ }^{2}$, Relative to Control States, 2019-2020 (Excluding states with local flavor policies)

| State | Massachusetts versus Control States ${ }^{5}$ |  |  | New York versus Control States |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Massachusetts <br> \% Change ( $95 \%$ CI) ${ }^{6}$ | Control States <br> \% Change (95\% CI) | $\begin{aligned} & \hline \mathbf{P -} \\ & \text { value } \end{aligned}$ | New York <br> \% Change (95\% CI) | Control States <br> \% Change (95\% CI) | Pvalue |
| Total Sales | -89.42 (-92.7, -84.67) | -24.29 (-31.14, -16.76) | <0.001 | -33.88 (-42.1, -24.51) | -16.74 (-27.54, -4.32) | 0.017 |
| Sales by Flavor |  |  |  |  |  |  |
| Tobacco | -65.56 (-80.95, -37.76) | -16.44 (-22.35, -10.08) | <0.001 | 83.42 (67.42, 100.95) | -19.76 (-24.51, -14.7) | $<0.001$ |
| Menthol | -99.79 (-99.93, -99.37) | 153.42 (98.12, 224.15) | <0.001 | -74.64 (-81.97, -64.34) | 122.97 (56.84, 216.96) | $<0.001$ |
| Mint | -100.00 (-100, -99.97) | -91.54 (-96.08, -81.75) | <0.001 | -94.47 (-97.72, -86.62) | -89.82 (-96.12, -73.25) | 0.34 |
| Other Flavors | -99.91 (-99.99, -99.28) | -34.17 (-49.36, -14.42) | <0.001 | -81.09 (-87.12, -72.26) | -15.51 (-38.98, 16.99) | <0.001 |
| Sales by Product |  |  |  |  |  |  |
| Disposables ${ }^{3}$ | -84.75 (-91.81, -71.61) | 52.43 (18.5, 96.07) | <0.001 | -26.32 (-46.25, 1.01) | 85.98 (53.38, 125.52) | $<0.001$ |
| Prefilled Cartridges ${ }^{4}$ | -89.80 (-92.91, -85.32) | -34.74 (-42.16, -26.37) | <0.001 | -34.12 (-43.95, -22.57) | -32.11 (-42.13, -20.35) | 0.785 |

[^0]2019; New York implemented these restrictions in May 2020. Additionally, these states restricted flavored e-cigarette sales at the local level California, Colorado, Georgia, Illinois, Maine, Ohio, Oregon.
${ }^{6}$ Confidence intervals and P-values were calculated using t-tests that compare periods after versus periods before flavored e-cigarette restrictions as well as total U.S. versus Massachusetts and New York, separately.

Table A2: Characteristics of e-cigarette product use reported by a cross-sectional sample of youth and young adults in Massachusetts and New York State over two survey periods, unweighted sample size, weighted percentages and unweighted percentages

|  | Massachusetts |  |  |  |  | New York State |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Time 1 |  | Time 2 |  | $\mathbf{p}-$ | Time 1 |  | Time 2 |  | $\begin{aligned} & \text { p- } \\ & \text { value } \end{aligned}$ |
|  | $\begin{aligned} & \text { (Feb 26, 2020-Apr 8, } \\ & 2020 \text { ) } \end{aligned}$ |  | $\begin{aligned} & \text { Aug } 26,2020 \text {-Oct } 20, \\ & 2020 \end{aligned}$ |  |  | $\begin{aligned} & \text { (Feb 26, 2020-May 27, } \\ & 2020 \text { ) } \end{aligned}$ |  | $\begin{aligned} & \text { (Aug 26, 2020-Jan } 4, \\ & 2021) \end{aligned}$ |  |  |
|  | n (wt. \%) | unwt.\% | n (wt. \%) | unwt.\% |  | n (wt. \%) | unwt.\% | n (wt. \%) | unwt.\% |  |
| Sample Characteristics |  |  |  |  |  |  |  |  |  |  |
| Age |  |  |  |  | 0.985 |  |  |  |  | 0.987 |
| 13-17 | $\begin{aligned} & 352 \\ & (39.0 \%) \end{aligned}$ | 33.8 | $\begin{aligned} & 385 \\ & (38.7 \%) \end{aligned}$ | 38.9 |  | $\begin{aligned} & 1,014 \\ & (39.8 \%) \end{aligned}$ | 38.9 | $\begin{aligned} & 1,127 \\ & (39.8 \%) \end{aligned}$ | 41.3 |  |
| 18-20 | $\begin{aligned} & 360 \\ & (27.5 \%) \end{aligned}$ | 34.5 | $\begin{aligned} & 268 \\ & (27.3 \%) \end{aligned}$ | 27.1 |  | $\begin{aligned} & 714 \\ & (26.4 \%) \end{aligned}$ | 27.4 | $\begin{aligned} & 750 \\ & (26.1 \%) \end{aligned}$ | 27.5 |  |
| 21-24 | $\begin{aligned} & 330 \\ & (33.5 \%) \end{aligned}$ | 31.7 | $\begin{aligned} & 337 \\ & (34.0 \%) \end{aligned}$ | 34.0 |  | $\begin{aligned} & 877 \\ & (33.9 \%) \end{aligned}$ | 33.7 | $\begin{aligned} & 854 \\ & (34.1 \%) \end{aligned}$ | 31.3 |  |
| Race/ethnicity |  |  |  |  | 0.998 |  |  |  |  | 0.995 |
| White NH | $\begin{aligned} & 676 \\ & (64.8 \%) \end{aligned}$ | 65.0 | $\begin{aligned} & 671 \\ & (64.9 \%) \end{aligned}$ | 68.1 |  | $\begin{aligned} & 1,492 \\ & (50.3 \%) \end{aligned}$ | 57.4 | $\begin{aligned} & 1,476 \\ & (50.2 \%) \end{aligned}$ | 54.4 |  |
| Black NH | $\begin{aligned} & 72 \\ & (8.3 \%) \end{aligned}$ | 6.9 | $\begin{aligned} & 59 \\ & (8.2 \%) \end{aligned}$ | 6.0 |  | $\begin{aligned} & 319 \\ & (15.3 \%) \end{aligned}$ | 12.3 | $\begin{aligned} & 363 \\ & (15.6 \%) \end{aligned}$ | 13.4 |  |
| Other NH, 2+ races | $\begin{aligned} & 129 \\ & (11.4 \%) \end{aligned}$ | 12.4 | $\begin{aligned} & 118 \\ & (11.6 \%) \end{aligned}$ | 12.0 |  | $\begin{aligned} & 318 \\ & (12.0 \%) \end{aligned}$ | 12.2 | $\begin{aligned} & 349 \\ & (12.0 \%) \end{aligned}$ | 12.9 |  |
| Hispanic | $\begin{aligned} & 163 \\ & (15.5 \%) \end{aligned}$ | 15.7 | $\begin{aligned} & 138 \\ & (15.2 \%) \end{aligned}$ | 14.0 |  | $\begin{aligned} & 472 \\ & (22.5 \%) \end{aligned}$ | 18.1 | $\begin{aligned} & 523 \\ & (22.3 \%) \end{aligned}$ | 19.3 |  |
| Gender |  |  |  |  | 0.825 |  |  |  |  | 0.778 |


| Male | $\begin{aligned} & 374 \\ & (50.0 \%) \end{aligned}$ | 35.9 | $\begin{aligned} & 512 \\ & (50.6 \%) \end{aligned}$ | 51.7 |  | $\begin{aligned} & 1,196 \\ & (50.3 \%) \end{aligned}$ | 45.9 | $\begin{aligned} & 1,409 \\ & (50.8 \%) \end{aligned}$ | 51.6 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Female | $\begin{aligned} & 668 \\ & (50.0 \%) \end{aligned}$ | 64.1 | $\begin{aligned} & 478 \\ & (49.4 \%) \end{aligned}$ | 48.3 |  | $\begin{aligned} & 1,409 \\ & (49.7 \%) \end{aligned}$ | 54.1 | $\begin{aligned} & 1,322 \\ & (49.2 \%) \end{aligned}$ | 48.4 |  |
| Financial Situation |  |  |  |  | 0.155 |  |  |  |  | 0.866 |
| Live comfortably | $\begin{aligned} & 461 \\ & (48.6 \%) \end{aligned}$ | 44.5 | $\begin{aligned} & 474 \\ & (50.6 \%) \end{aligned}$ | 48.0 |  | $\begin{aligned} & 1,264 \\ & (46.7 \%) \end{aligned}$ | 48.6 | $\begin{aligned} & 1,321 \\ & (47.5 \%) \end{aligned}$ | 48.5 |  |
| Meet needs with a little left | $\begin{aligned} & 350 \\ & (31.3 \%) \end{aligned}$ | 33.8 | $\begin{aligned} & 321 \\ & (31.0 \%) \end{aligned}$ | 32.5 |  | $\begin{aligned} & 850 \\ & (32.9 \%) \end{aligned}$ | 32.7 | $\begin{aligned} & 872 \\ & (31.4 \%) \end{aligned}$ | 32.0 |  |
| Just meet basic expenses | $\begin{aligned} & 197 \\ & (16.6 \%) \end{aligned}$ | 19.0 | $\begin{aligned} & 146 \\ & (13.1 \%) \end{aligned}$ | 14.8 |  | $\begin{aligned} & 405 \\ & (15.8 \%) \end{aligned}$ | 15.6 | $\begin{aligned} & 427 \\ & (16.3 \%) \end{aligned}$ | 15.7 |  |
| Don't meet basic expenses | $\begin{aligned} & 29 \\ & (3.5 \%) \end{aligned}$ | 2.8 | $\begin{aligned} & 47 \\ & (5.3 \%) \end{aligned}$ | 4.8 |  | 80 (4.6\%) | 3.1 | $\begin{aligned} & 103 \\ & (4.8 \%) \end{aligned}$ | 3.8 |  |
| E-cigarette use |  |  |  |  |  |  |  |  |  |  |
| Ever | $\begin{aligned} & 462 \\ & (42.3 \%) \end{aligned}$ | 44.5 | $\begin{aligned} & 399 \\ & (39.6 \%) \end{aligned}$ | 40.5 | 0.317 | $\begin{aligned} & 1,130 \\ & (38.9 \%) \end{aligned}$ | 43.5 | $\begin{aligned} & 1,189 \\ & (40.6 \%) \end{aligned}$ | 43.7 | 0.329 |
| Current | $\begin{aligned} & 238 \\ & (22.7 \%) \end{aligned}$ | 22.8 | $\begin{aligned} & 194 \\ & (19.3 \%) \end{aligned}$ | 19.6 | 0.121 | $\begin{aligned} & 642 \\ & (20.1 \%) \end{aligned}$ | 24.7 | $\begin{aligned} & 733 \\ & (22.2 \%) \end{aligned}$ | 26.9 | 0.144 |
| Flavors used in past 30days |  |  |  |  |  |  |  |  |  |  |
| Tobacco | $\begin{aligned} & 55 \\ & (28.7 \%) \end{aligned}$ | 23.1 | $\begin{aligned} & 59 \\ & (32.4 \%) \end{aligned}$ | 30.4 | 0.523 | $\begin{aligned} & 121 \\ & (16.6 \%) \end{aligned}$ | 18.9 | $\begin{aligned} & 213 \\ & (26.2 \%) \end{aligned}$ | 29.1 | 0.001 |
| Menthol | $\begin{aligned} & 66 \\ & (30.5 \%) \end{aligned}$ | 27.7 | $\begin{aligned} & 39 \\ & (21.1 \%) \end{aligned}$ | 20.1 | 0.084 | $\begin{aligned} & 166 \\ & (26.4 \%) \end{aligned}$ | 25.9 | $\begin{aligned} & 202 \\ & (27.4 \%) \end{aligned}$ | 27.6 | 0.751 |
| Mint | $\begin{aligned} & 100 \\ & (40.8 \%) \end{aligned}$ | 42.0 | $\begin{aligned} & 37 \\ & (20.7 \%) \end{aligned}$ | 19.1 | 0.001 | $\begin{aligned} & 223 \\ & (36.7 \%) \end{aligned}$ | 34.8 | $\begin{aligned} & 200 \\ & (30.2 \%) \end{aligned}$ | 27.4 | 0.063 |
| Fruit | $\begin{aligned} & 114 \\ & (44.2 \%) \end{aligned}$ | 47.9 | $\begin{aligned} & 89 \\ & (50.8 \%) \end{aligned}$ | 45.9 | 0.265 | $\begin{aligned} & 308 \\ & (50.4 \%) \end{aligned}$ | 48.0 | $\begin{aligned} & 318 \\ & (47.1 \%) \end{aligned}$ | 43.5 | 0.363 |
| Other | $\begin{aligned} & 60 \\ & (25.0 \%) \end{aligned}$ | 25.2 | $\begin{aligned} & 58 \\ & (32.0 \%) \end{aligned}$ | 29.9 | 0.193 | $\begin{aligned} & 223 \\ & (32.4 \%) \end{aligned}$ | 34.8 | $\begin{aligned} & 260 \\ & (35.9 \%) \end{aligned}$ | 35.6 | 0.305 |
| Device type |  |  |  |  | 0.104 |  |  |  |  | 0.001 |
| Disposable | $\begin{aligned} & 71 \\ & (29.1 \%) \end{aligned}$ | 30.0 | $\begin{aligned} & 70 \\ & (38.2 \%) \end{aligned}$ | 37.4 |  | $\begin{aligned} & 180 \\ & (27.1 \%) \end{aligned}$ | 28.6 | $\begin{aligned} & 260 \\ & (38.2 \%) \end{aligned}$ | 36.8 |  |


| Pod mod | $\begin{aligned} & 131 \\ & (56.0 \%) \end{aligned}$ | 55.3 | $\begin{aligned} & 81 \\ & (43.0 \%) \end{aligned}$ | 43.3 |  | $\begin{aligned} & 333 \\ & (48.7 \%) \end{aligned}$ | 52.9 | $\begin{aligned} & 330 \\ & (45.6 \%) \end{aligned}$ | 46.7 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Tank/mod | $\begin{aligned} & 35 \\ & (14.9 \%) \end{aligned}$ | 14.8 | $\begin{aligned} & 36 \\ & (18.8 \%) \end{aligned}$ | 19.3 |  | $\begin{aligned} & 128 \\ & (24.2 \%) \end{aligned}$ | 18.4 | $\begin{aligned} & 116 \\ & (16.2 \%) \end{aligned}$ | 16.4 |  |
| Flavors by device type |  |  |  |  |  |  |  |  |  |  |
| Tobacco |  |  |  |  | 0.891 |  |  |  |  | 0.007 |
| Disposable | $\begin{aligned} & 15 \\ & (31.6 \%) \end{aligned}$ | 27.3 | $\begin{aligned} & 20 \\ & (36.5 \%) \end{aligned}$ | 35.7 |  | $\begin{aligned} & 32 \\ & (20.9 \%) \end{aligned}$ | 26.4 | $\begin{aligned} & 76 \\ & (32.6 \%) \end{aligned}$ | 36.0 |  |
| Pod mod | $\begin{aligned} & 33 \\ & (53.2 \%) \end{aligned}$ | 60.0 | $\begin{aligned} & 27 \\ & (47.6 \%) \end{aligned}$ | 48.2 |  | $\begin{aligned} & 63 \\ & (46.1 \%) \end{aligned}$ | 52.1 | $\begin{aligned} & 106 \\ & (53.7 \%) \end{aligned}$ | 50.2 |  |
| Tank/mod | $\begin{aligned} & 7 \\ & (15.2 \%) \end{aligned}$ | 12.7 | $\begin{aligned} & 9 \\ & (15.9 \%) \end{aligned}$ | 16.1 |  | $\begin{aligned} & 26 \\ & (33.1 \%) \end{aligned}$ | 21.5 | $\begin{aligned} & 29 \\ & (13.7 \%) \end{aligned}$ | 13.7 |  |
| Menthol |  |  |  |  | 0.129 |  |  |  |  | 0.135 |
| Disposable | $\begin{aligned} & 14 \\ & (20.3 \%) \end{aligned}$ | 21.2 | $\begin{aligned} & 15 \\ & (43.0 \%) \end{aligned}$ | 38.5 |  | $\begin{aligned} & 32 \\ & (20.4 \%) \end{aligned}$ | 19.3 | $\begin{aligned} & 71 \\ & (31.7 \%) \end{aligned}$ | 35.3 |  |
| Pod mod | $\begin{aligned} & 45 \\ & (68.5 \%) \end{aligned}$ | 68.2 | $\begin{aligned} & 21 \\ & (50.2 \%) \end{aligned}$ | 53.8 |  | $\begin{aligned} & 106 \\ & (55.4 \%) \end{aligned}$ | 63.9 | $\begin{aligned} & 104 \\ & (53.0 \%) \end{aligned}$ | 51.7 |  |
| Tank/mod | $\begin{aligned} & 7 \\ & (11.3 \%) \end{aligned}$ | 10.6 | 3 (6.9\%) | 7.7 |  | $\begin{aligned} & 28 \\ & (24.1 \%) \end{aligned}$ | 16.9 | $\begin{aligned} & 26 \\ & (15.3 \%) \end{aligned}$ | 12.9 |  |
| Mint |  |  |  |  | 0.934 |  |  |  |  | 0.64 |
| Disposable | $\begin{aligned} & 34 \\ & (34.9 \%) \end{aligned}$ | 34.0 | $\begin{aligned} & 9 \\ & (34.0 \%) \end{aligned}$ | 25.0 |  | $\begin{aligned} & 72 \\ & (32.5 \%) \end{aligned}$ | 32.3 | $\begin{aligned} & 67 \\ & (38.3 \%) \end{aligned}$ | 34.7 |  |
| Pod mod | $\begin{aligned} & 61 \\ & (58.6 \%) \end{aligned}$ | 61.0 | $\begin{aligned} & 23 \\ & (56.9 \%) \end{aligned}$ | 63.9 |  | $\begin{aligned} & 114 \\ & (50.1 \%) \end{aligned}$ | 51.1 | $\begin{aligned} & 90 \\ & (44.9 \%) \end{aligned}$ | 46.6 |  |
| Tank/mod | 5 (6.5\%) | 5.0 | 4 (9.0\%) | 11.1 |  | $\begin{aligned} & 37 \\ & (17.5 \%) \end{aligned}$ | 16.6 | $\begin{aligned} & 36 \\ & (16.8 \%) \end{aligned}$ | 18.7 |  |
| Fruit |  |  |  |  | 0.062 |  |  |  |  | 0.004 |
| Disposable | $\begin{aligned} & 41 \\ & (33.3 \%) \end{aligned}$ | 36.0 | $\begin{aligned} & 34 \\ & (41.0 \%) \end{aligned}$ | 39.1 |  | $\begin{aligned} & 88 \\ & (30.2 \%) \end{aligned}$ | 28.6 | $\begin{aligned} & 130 \\ & (45.5 \%) \end{aligned}$ | 42.3 |  |
| Pod mod | $\begin{aligned} & 53 \\ & (52.7 \%) \end{aligned}$ | 46.5 | $\begin{aligned} & 28 \\ & (33.1 \%) \end{aligned}$ | 32.2 |  | $\begin{aligned} & 148 \\ & (42.9 \%) \end{aligned}$ | 48.1 | $\begin{aligned} & 125 \\ & (39.1 \%) \end{aligned}$ | 40.7 |  |
| Tank/mod | $\begin{aligned} & 20 \\ & (14.0 \%) \end{aligned}$ | 17.5 | $\begin{aligned} & 25 \\ & (26.0 \%) \end{aligned}$ | 28.7 |  | $\begin{aligned} & 72 \\ & (26.9 \%) \end{aligned}$ | 23.4 | $\begin{aligned} & 52 \\ & (15.3 \%) \end{aligned}$ | 16.9 |  |
| Other flavors |  |  |  |  | 0.027 |  |  |  |  | 0.157 |
| Disposable | $\begin{aligned} & 16 \\ & (20.2 \%) \end{aligned}$ | 26.7 | $\begin{aligned} & 24 \\ & (47.2 \%) \end{aligned}$ | 42.9 |  | $\begin{aligned} & 59 \\ & (26.4 \%) \end{aligned}$ | 26.6 | $\begin{aligned} & 85 \\ & (37.5 \%) \end{aligned}$ | 34.3 |  |


| Pod mod | $\begin{aligned} & 29 \\ & (58.0 \%) \end{aligned}$ | 48.3 | $\begin{aligned} & 23 \\ & (39.2 \%) \end{aligned}$ | 41.1 | $\begin{aligned} & 110 \\ & (48.8 \%) \end{aligned}$ | 49.5 | $\begin{aligned} & 113 \\ & (40.9 \%) \end{aligned}$ | 45.6 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Tank/mod | $\begin{aligned} & 15 \\ & (21.8 \%) \end{aligned}$ | 25.0 | $\begin{aligned} & 9 \\ & (13.6 \%) \end{aligned}$ | 16.1 | $\begin{aligned} & 53 \\ & (24.8 \%) \end{aligned}$ | 23.9 | $\begin{aligned} & 50 \\ & (21.5 \%) \end{aligned}$ | 20.2 |  |

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[^0]:    ${ }^{1}$ Unit sales were standardized to reflect the most common package size by product type. A standardized unit was equal to: 5 prefilled cartridges; 1 disposable device; 1 e-liquid bottle.
    ${ }^{2}$ For Massachusetts, pre-intervention period is the period during Jan 2019-October 2019; post-intervention period is October 2019 - Dec 2020. For New York, pre-intervention period is the period during Jan 2019-May 2020; post-intervention period was May 2020- Dec 2020.
    ${ }^{3}$ Prefilled cartridges include tanks, cartridges, and pods used in rechargeable and reusable e-cigarette device; the cartridges are not intended to be refilled after the liquid has been depleted.
    ${ }^{4}$ Disposable devices include nonrechargeable and nonreusable e-cigarette devices that are not intended to be refilled with e-liquid after being depleted; the device is disposed of once the e-liquid has been consumed.
    ${ }^{5}$ Sales in control state were calculated by subtracting e-cigarette sales in states that implemented statewide e-cigarette flavor restrictions as well as states with local restrictions on flavored e-cigarette sales from total U.S. sales during the times when these bans were in effect. The following four states have restricted flavored e-cigarette sales: Massachusetts, Rhode Island, and Washington (lasted for 120 days) implemented restrictions on flavored e-cigarette sales in October

