Supplemental Online Content

Kaplan S, White JS, Madsen KA, Basu S, Villas-Boas SB, Schillinger D. Evaluation of changes in prices and purchases following implementation of sugar-sweetened beverage taxes across the US. *JAMA Health Forum.* 2024;5(1):e234737. doi:10.1001/jamahealthforum.2023.4737

This supplemental material has been provided by the authors to give readers additional information about their work.

eMETHODS

1. Nielsen Data and Beverage Classification Procedure

The Nielsen retail scanner dataset was made available through a subscription to the Kilts Marketing Center at the University of Chicago Booth School of Business. The data is comprised of ten general product categories: HEALTH AND BEAUTY CARE, DRY GROCERY, FROZEN FOODS, DAIRY, DELI, PACKAGED MEAT, FRESH PRODUCE, NON-FOOD GROCERY, ALCOHOLIC BEVERAGES, GENERAL MERCHANDIZE, and UNCLASSIFIED. We query all products falling within the DRY GROCERY category. Within the DRY GROCERY category, we select the following subcategories of products, which form the sample of UPCs we initially work with: JUICE DRINKS – CANNED, BOTTLED; CARBONATED BEVERAGES; and SOFT DRINKS – NON-CARBONATED.

Because the Nielsen data provides limited nutritional information about each product, we leverage 10-digit UPC data from Label Insight (LI) and hand-coded data from a previous study[1] to classify individual products into SSB vs. non-SSB status. These two datasets include information regarding total calories, total sugar, added sugar per serving, serving size, and presence of artificial sweeteners, which allowed us to ascertain the SSB status for each UPC. Because the Nielsen data provides UPCs in EAN-13 format (with the check digit dropped), and LI and the hand-coded data contain information at the 10-digit UPC level, we convert the Nielsen 12-digit UPCs into 10-digit UPCs. We do so by following the procedure laid out in documentation from Label Insights to merge their UPC data with Nielsen UPC data, i.e. we drop the first two digits of Nielsen UPCs and the first and last digits of Label Insights UPCs. Any UPCs that become duplicated due to this procedure are simply aggregated together. We also took this classification approach with the hand-coded data.

We were successful in matching on 18,147 10-digit UPCs, which make up 84.0% of the total sales volume in the Nielsen beverage data over our study period. Of the matched 10-digit UPCs, 5,500 are classified as SSBs, which account for 39.7% of volume sales in the matched data. This forms the set of products we use in our analyses.

2. Augmented Synthetic Control Model

Synthetic control models have become widely used in panel data analyses to assess policy changes.[2-3] These models are advantageous because they algorithmically create a counterfactual unit that can be directly compared to a treated unit of interest without worrying about fundamental differences in outcomes or characteristics of the two groups, by construction. Using our setting as an example, the base synthetic control model matches pre-tax outcomes and covariates of taxed and untaxed units by weighting each untaxed unit in such a way that the "synthetic" unit(s) closely match the taxed unit(s) on both the outcome measure of interest and covariate characteristics. In particular, for each outcome Y_{im} for 3-digit zip code i in month m, and X_i 3-digit zip code-level covariates (which in our case are time-invariant), the method chooses weights for each untaxed 3-digit zip code j (w_j) to minimize the distance $(Y_{im}, X_i) - \sum_j w_j \left(Y_{jm}, X_j\right)$.[4]

Recent work has extended the initial synthetic control approach in various ways.[5-7] There are two notable enhancements of the original synthetic control method that we leverage in this study. First, the original synthetic control framework was designed to estimate the impact of an intervention on a single treated unit. In our setting, we study multiple treated units that experience treatment at different times, referred to as a "staggered adoption" setup.[8] Second, the use of the original synthetic control method was recommended only when the synthetic unit's pretreatment outcomes closely matched the pre-treatment outcomes of the treated unit. Our study takes advantage of recent work that relaxes this requirement by introducing a "bias-correction" procedure. This estimation framework is called the augmented synthetic control (ASC) model, since it augments the original synthetic control approach with an outcome model that is used to determine bias as a result of a relatively poor pretreatment fit between the treated and synthetic units, and then uses the output to remove the bias in the pretreatment period.[9] While there are several different outcome models that can be used to de-bias the synthetic control model, the primary method used is a ridge regression model.[9] A ridge regression model estimates a linear regression of post-treatment outcomes of the control units ($Y_{jm} | m \geq T$), where T indicates the month of tax implementation, on the centered pretreatment outcomes of the control units ($Y_{jm}|m < T$). This modification allows certain donor units to be assigned negative weights (whereas the original synthetic control procedure restricts all weights on donor units to be ≥ 0), which can improve pretreatment fit. Additional structure and details of this procedure can be found in sections 2-4 of Ben-Michael, Feller, and Rothstein (2021).

Sociodemographic and geographic characteristics used in constructing synthetic units were taken from the 2010 Decennial Census and 2016 American Community Survey. Characteristics included population size (2010), median household income (2016), racial/ethnic composition (proportion non-Hispanic White, non-Hispanic Black, Hispanic, Asian, and American Indian/Alaska Native 2010), proportion in poverty (household income <$10,000K, 2016), proportion of individuals 18 to 64 years old (2010), number of housing units (2010), and percentage of the population defined as urban (2010).

One important implication of the use of synthetic control methods is the importance of a donor pool consisting of units that could plausibly act as reasonable controls for the treated units.[4] Failure to do so can lead to substantial bias in the estimation. Because of this, we decide to limit the donor pool of 3-digit zip codes to those with urbanicity levels that are similar to the treated units. Using a measure of urbanicity is desirable for different reasons. First, it's easily defined by and computed using information and data from the US Census.[10] Second, urbanicity captures several observed and unobserved characteristics that are likely to influence the relative similarity among control and treated units, including characteristics we include like population, median household income, number of housing units, etc., as well as characteristics we do not observe, like housing prices, police presence, and voter party alignment. Finally, our five treated localities have an average urbanicity level of 0.98, which ranges from a minimum of 0.94 (Boulder) to 1 (Philadelphia and San Francisco). This relative similarity between the treated units' urbanicity allows for the construction of a donor pool that could plausibly act as reasonable controls for each of the treated units, while keeping the donor pool the same for each.

In the primary augmented synthetic control estimation, we use a subsample of control (donor) units that fall within one standard deviation of the average urbanicity level of the five treated localities. In the cross-border shopping analyses, we use a subsample of donor units that fall within one standard deviation of the average urbanicity level of the thirteen adjacent border localities. Robustness checks, which are included in eFigures 10-15, include control units with urbanicity levels >0.85 and >0.9. The results from these supplementary estimations are qualitatively unchanged.

Because implementation of the tax happened at different times across the five treated localities (hence the “staggered adoption” nature of the BCSC procedure), calendar time is converted to event-time, which normalizes time = 0 to the month when the tax went into place in each treated locality. Therefore, in event time we observe a different number of total time periods for each taxed locality. Consequently, we provide results from a “balanced” estimation, which only considers event-time periods when all treated localities are present in the sample. This is done to avoid biasing the estimation in favor of taxed localities that are observed in the data during event-time periods when other taxed localities may not be observed.

To determine the statistical significance of our augmented synthetic control average treatment effects, which are calculated as the average post-tax percent change in SSB purchases (shelf prices), we use an in-space placebo generation inference procedure.[3,11] For each of the five treated localities, we generate in-space placebo estimates for each donor pool unit one-by-one as if each unit had been treated. Because treated localities implement taxes at different times, we repeat this procedure for each of the five different treated localities, which generates 279*5=1,395 placebo estimates. To generate p-values, we compute the ratio of mean squared prediction error (RMSPE) in the post-tax vs. pre-tax period for the composite unit estimate and each of the placebo unit estimates, and rank them from largest to smallest.[11] The p-value for the estimation is calculated as the ratio of the composite unit numerical ranking with respect to the total number of units (1,396). Each of the BCSC plots takes 100 quasi-randomly selected placebo lines from the universe of 1,396 placebos for the composite estimation and 279 for each of the individual city estimations. This selection procedure is quasi-random in the sense that the universe of eligible placebos to be chosen is "pruned" to those that exhibit a pre-period MSPE that is no greater than five times the pre-period MSPE of the treated unit. Confidence intervals were obtained from p-values using the method outlined by Altman.[12]

3. Two-Way Fixed Effects (TWFE) Model

Two-way fixed effects (TWFE) models make up one of the most common empirical approaches to identifying the impact of a treatment (e.g. policy intervention) using panel data.[13-14] This approach has also been often used in the SSB tax evaluation literature.[1,16-17]

Using this conventional approach, we estimate a series of TWFE models and TWFE event study models. The simple TWFE model takes the following form:

$$Y_{it} = \beta Tax_{it} + \alpha_i + \delta_t + \epsilon_{it}$$

Where Y_{it} indicates the outcome variable of interest (i.e. volume purchased or shelf prices) in 3-digit zip code i in month-year t, Tax_{it} is a binary variable =1 if 3-digit zip code i has an SSB tax in place during month-year t and =0 otherwise, and α_i and δ_t represent 3-digit zip code and month-year fixed effects, respectively. β measures the treatment effect associated with the implementation of an SSB tax on the outcome variable of interest. We estimate such a TWFE model to determine both the composite effect (by including all five treated 3-digit zip codes) as well as individual city effects (separate estimations for each of the five treated 3-digit zip codes). eTable 3 presents the TWFE estimates for each of these specifications.

We also estimate a TWFE event study specification, which estimates individual coefficients for each month-year in event-time, which is normalized to 0 at the month-year when an SSB tax is implemented in 3-digit zip code i. Again, we estimate a TWFE event study to determine both the composite effect (by including all five treated 3-digit zip codes) as well as individual city effects (separate estimations for each of the five treated 3-digit zip codes). The TWFE event-study model takes the following form:

$$Y_{ite} = \sum_{e=-a \setminus \{-1\}}^{b} \beta_e \, Tax_{e,it} + \alpha_i + \delta_t + \epsilon_{ite}$$

Where e represents the month-year in event-time, ranging from $-a$ to b. The period prior to implementation of an SSB tax (-1) is omitted. β_e is a vector of coefficients indexed by event-time that can be interpreted relative to the omitted event-time period. $Tax_{e,it} = 1$ if 3-digit zip code i has been treated at event-time e. eFigure 16 presents the event study results for the composite estimation, while eFigures 17-19 present the event study results for the individual city estimations.

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eTable 1. Total Coverage of SSB Ounces Sold in Matched Nielsen Retail Scanner Data

City (first complete fiscal year of SSB tax)	**Tax Revenue** ($000's)	**Tax** ($/Ounce)	**Total SSB Sales** (1000s of Ounces)	**SSB Sales of Nielsen UPCs** (1000s of Ounces)	**Coverage (%)**
Boulder (2018)	$4,868	$.02	243,400	50,781	20.86%
Oakland (Jul 2017–Jun 2018)	$11,076	$.01	1,107,600	171,850	15.52%
Philadelphia (Jul 2017–Jun 2018)	$77,421	$.015	5,161,400	240,146	4.65%
San Francisco (Jul 2018–Jun 2019)	$16,098	$.01	1,609,800	287,089	17.83%
Seattle (2018)	$22,254	$.0175	1,271,657	404,600	31.82%
Composite	$131,717	$.0145	9,083,931	1,154,468	12.71%

*Note***:** Tax revenues taken from Krieger et al. (2021).[1] Coverage estimates use the first fiscal year of each city's respective tax implementation. Lower coverage in Philadelphia is in part due to the exclusion of artificially sweetened beverages in our analysis. The tax amount for the Composite geographic unit is the unweighted average of the tax amounts across the five taxed cities.

[1] Krieger J, Magee K, Hennings T, Schoof J, Madsen KA. How sugar-sweetened beverage tax revenues are being used in the United States. Preventive Medicine Reports. 2021 Sep 1;23:101388.

eTable 2. Total Population (2010) by City within Taxed 3-Digit Zip Codes

3-Digit Zip Code	City	Tax Status	Population (2010)	% of 3-Digit Zip Code Population	% of Overall Population
803	Boulder	Tax	97,724	100.00%	2.66%
946	Oakland	Tax	391,350	94.95%	10.64%
	Emeryville	No Tax	10,110	2.45%	0.27%
	Piedmont	No Tax	10,709	2.60%	0.29%
191	Philadelphia	Tax	1,528,000	99.61%	41.53%
	Manayunk	No Tax	5,913	0.39%	0.16%
941	San Francisco	Tax	805,519	100.00%	21.89%
981	Seattle	Tax	610,654	73.57%	16.60%
	Tukwila	No Tax	19,161	2.31%	0.52%
	Bainbridge Island	No Tax	23,062	2.78%	0.63%
	Shoreline	No Tax	53,182	6.41%	1.45%
	Burien	No Tax	48,224	5.81%	1.31%
	Des Moines	No Tax	29,775	3.59%	0.81%
	Normandy Park	No Tax	6,335	0.76%	0.17%
	Seatac	No Tax	26,999	3.25%	0.73%
	Lake Forest Park	No Tax	12,639	1.52%	0.34%
	TOTAL	Tax	3,433,247	--	**93.31%**
	TOTAL	No Tax	246,109	--	**6.69%**

Note: Population estimates for each city taken from 2010 (source: US Census Bureau). In the "981" 3-digit zip code, some untaxed cities (e.g. Bainbridge Island) overlap with other untaxed 3-digit zip codes (e.g. Bainbridge Island includes areas in the 980 and 983 zip codes). Therefore, population estimates for untaxed cities in the "981" 3-digit zip code may include people from untaxed 3-digit zip codes. Because of this, the estimate of the % of the population covered by an SSB tax in the "981" 3-digit zip code is conservative (underestimated).

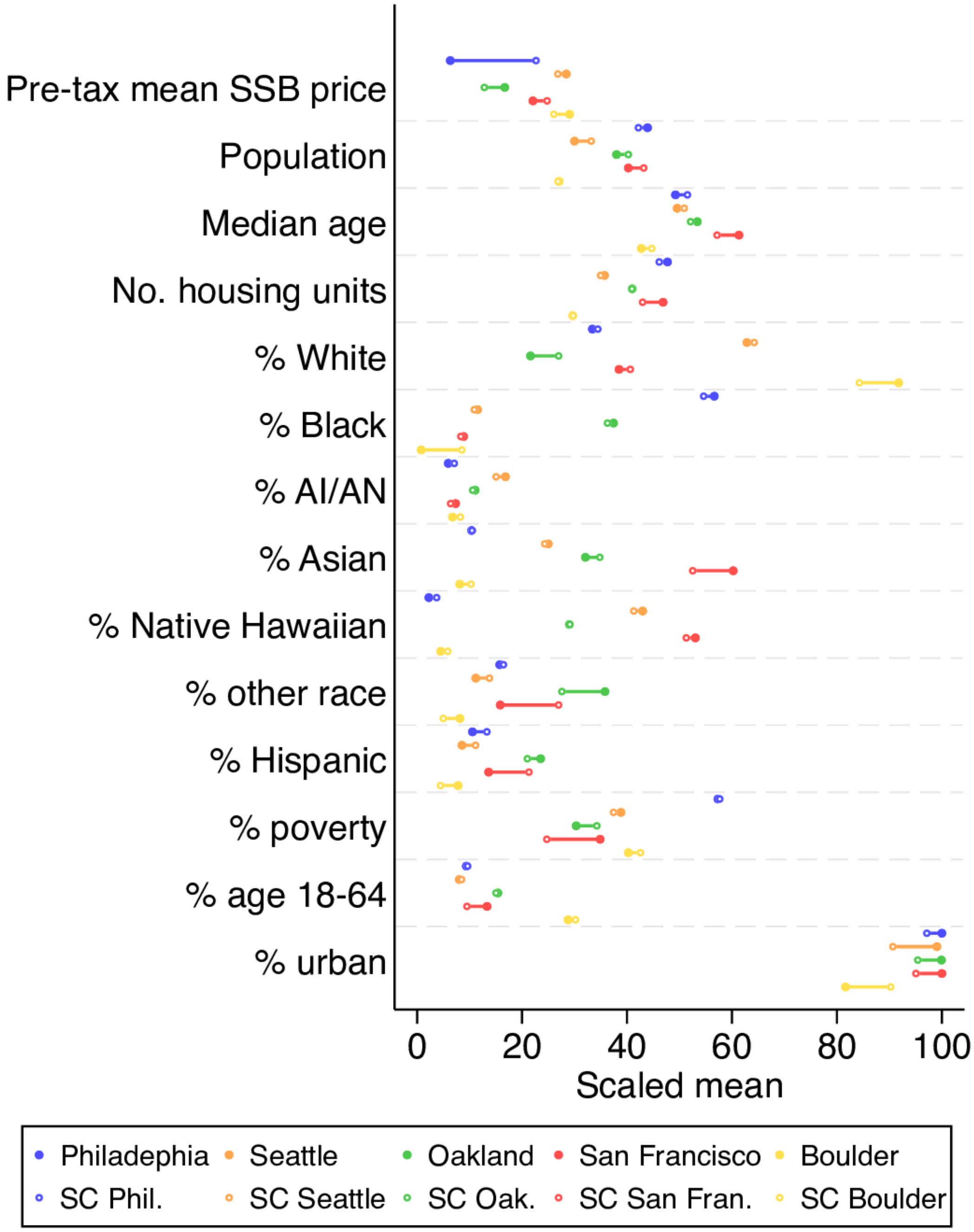
eTable 3. Two-Way Fixed Effects Estimation Results for Composite and Individual City Analyses

	Volume Purchases (Oz.)	Avg. Price per Oz.	Border Volume Purchases (Oz.)
Composite (Balanced)	-10,087,267.0***	0.0123***	-2,486,372.0**
	(2,711,915.0)	(0.0026)	(883,365.0)
Dep. Var. Pretreatment Mean	27,850,700	0.041	42,345,118
Percent Change (%)	-36.22	30.38	-5.87
Observations	16,980	16,980	21,984
Boulder	-4,509,647.0***	0.0215***	906,480.0
	(507,729.0)	(0.0003)	(1,000,519.0)
Dep. Var. Pretreatment Mean	6,112,734	0.045	3,378,103
Percent Change (%)	-73.77	47.39	26.83
Observations	27,440	27,440	36,162
San Francisco	-12,068,979.0***	0.0142***	-5,667,943.0**
	(586,217.0)	(0.0003)	(1,929,936.0)
Dep. Var. Pretreatment Mean	31,0762,01	0.041	72,366,839
Percent Change (%)	-38.84	34.33	-7.83
Observations	27,440	27,440	36,162
Philadelphia	-24,102,200.0***	0.0215***	-4,808,432.0
	(453,161.0)	(0.0003)	(2,464,901.0)
Dep. Var. Pretreatment Mean	44,5485,78	0.032	42,233,523
Percent Change (%)	-54.1	66.1	-11.39
Observations	27,440	27,440	36,162
Oakland	-4,114,207.0***	0.0092***	-5,022,741.0
	(507,729.0)	(0.0003)	(2,668,559.0)
Dep. Var. Pretreatment Mean	15,561,263	0.038	16,544,381
Percent Change (%)	-26.44	23.87	-30.36
Observations	27,440	27,440	36,162
Seattle	-12,428,611.0***	0.0057***	-1,366,042.0
	(586,217.0)	(0.0003)	(1,543,743.0)
Dep. Var. Pretreatment Mean	41,954,725	0.045	38,603,038
Percent Change (%)	-29.62	12.59	-3.54
Observations	27,440	27,440	36,162

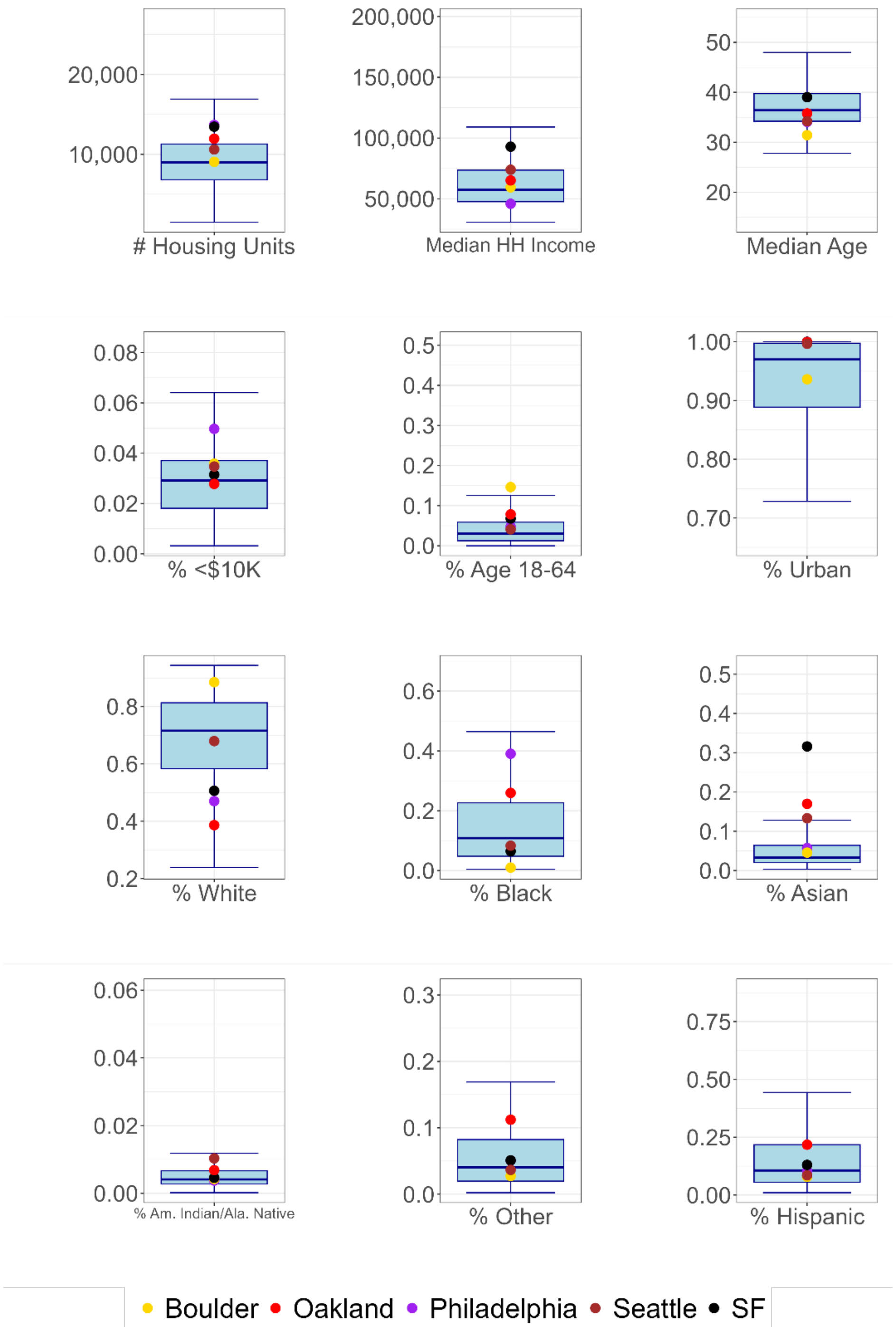
Note: *p<0.05 **p<0.01 ***p<0.001

All specifications include 3-digit zip code and month-year fixed effects. Standard errors are robustly estimated and clustered at the 3-digit zip code level.

eFigure 1. Comparing Treated and Synthetic Values of Prognostic Factors from the Analysis of SSB Shelf Prices

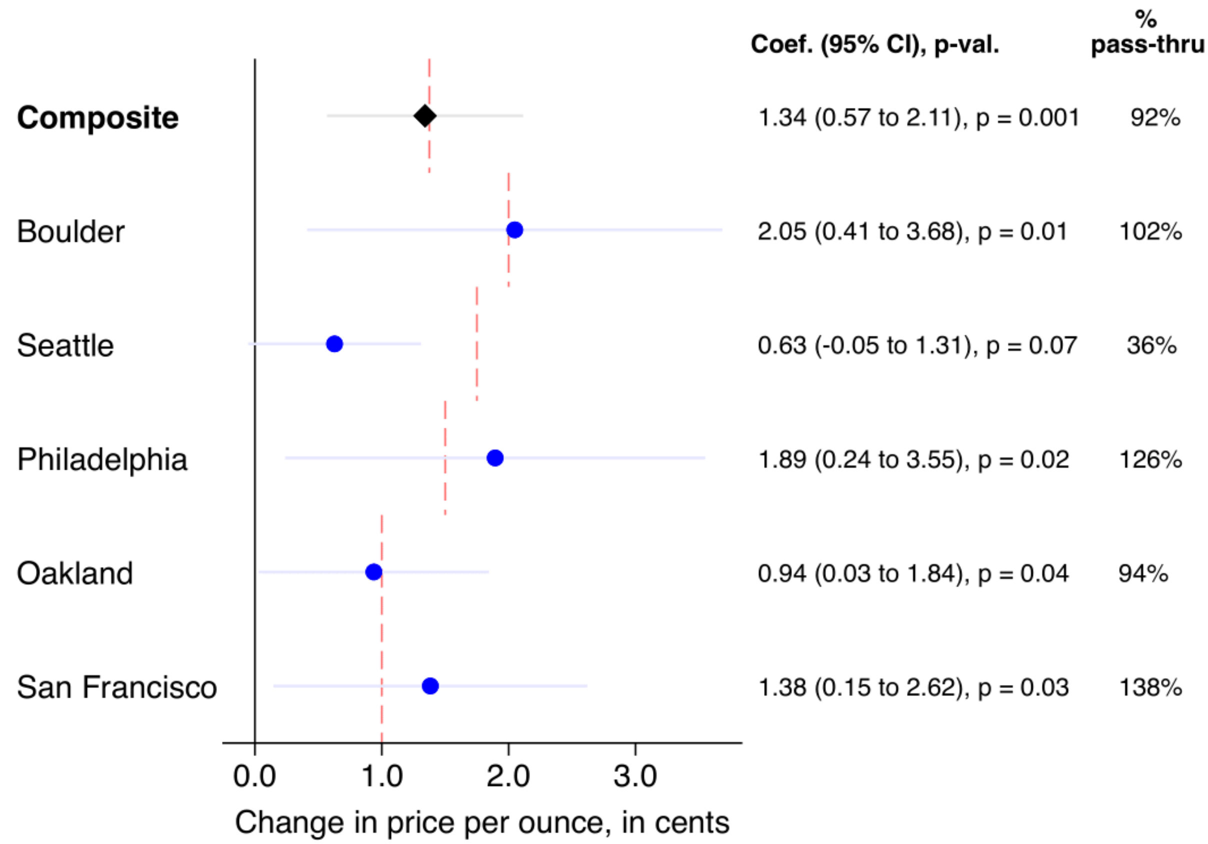


eFigure 2. Overlap of US Census Sociodemographic Characteristics between each taxed city and the donor pool of control 3-digit zip codes



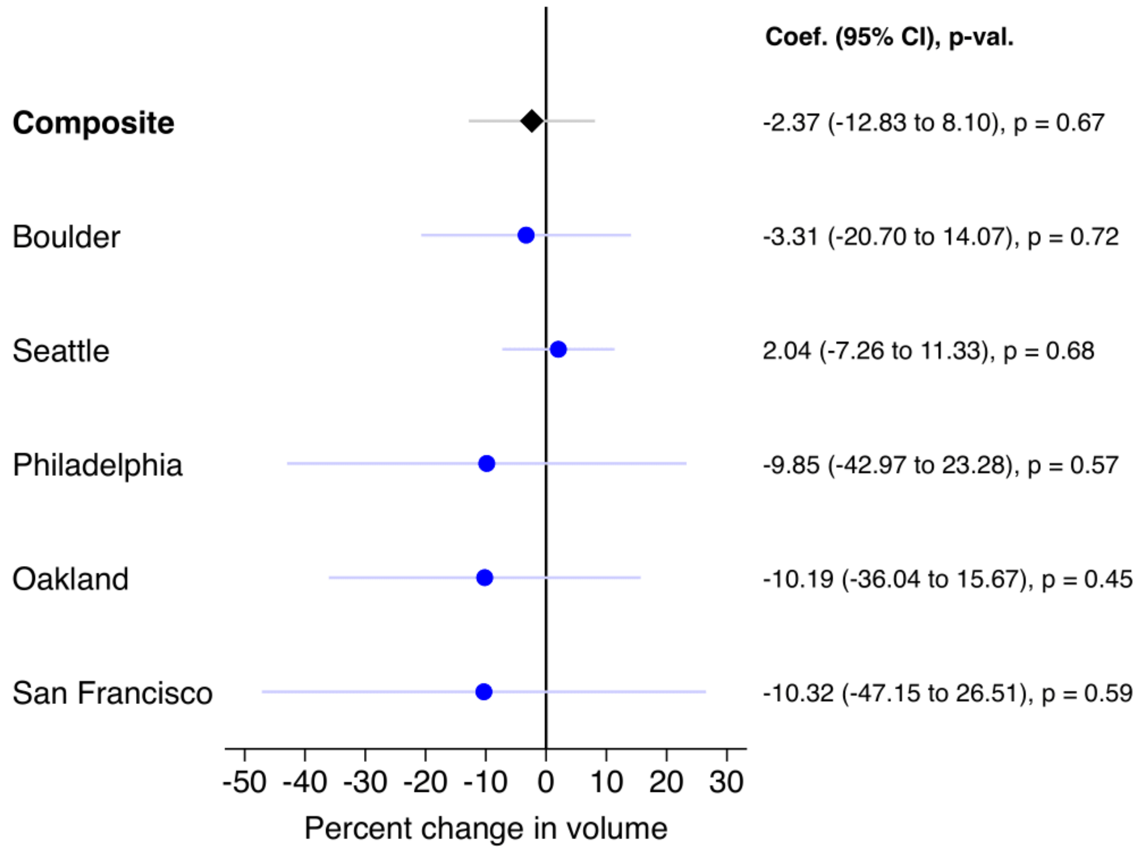
Note: Metrics for each 3-digit zip code were taken from either the 2010 Census or 2016 American Community Survey (ACS). Colored points on each plot represent values for each of the five treated localities. Box plots for each characteristic are formed from the distribution within the subsample of 3-digit zip codes used in the primary analysis.

eFigure 3. Composite and Individual Locality Price Pass-Through



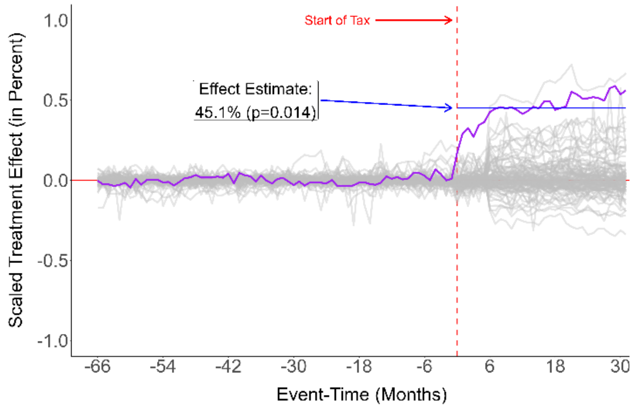
Note: Coefficient estimates represent the average total number of cents per ounce passed through to shelf prices of SSB products in the composite estimation and each individual treated locality. Dotted red lines denote full (100%) pass-through. Lightly shaded horizontal lines through each coefficient indicate 95% confidence intervals. % pass-thru indicates the % of the per-ounce tax in the composite estimation and each individual treated locality that was reflected in changes in shelf prices.

eFigure 4. Composite and Individual Changes in Volume Sales in Adjacent Border Zip Codes

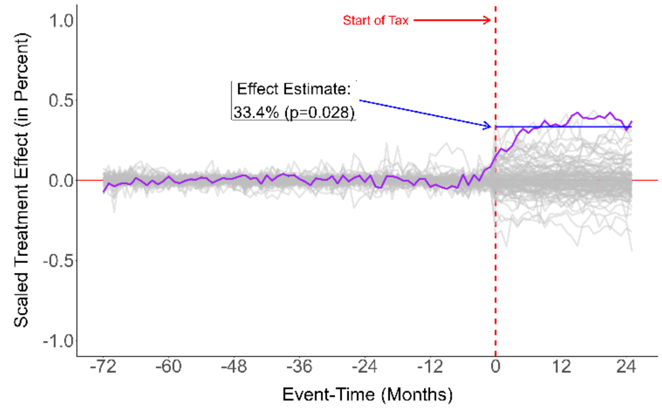


Note: Coefficient estimates represent the % change in SSB purchases in immediately adjacent border localities to each treated locality, and all borders in the composite estimation. Lightly shaded horizontal lines through each coefficient indicate 95% confidence intervals. Corresponding 95% confidence intervals and p-values are indicated next to each coefficient.

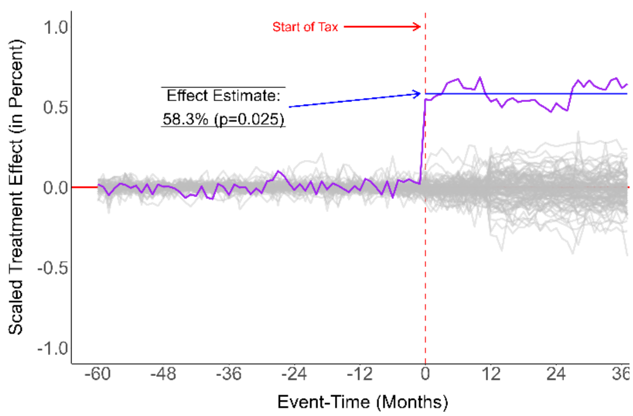
eFigure 5. Augmented Synthetic Control Estimates for Individual Locality Changes in Price



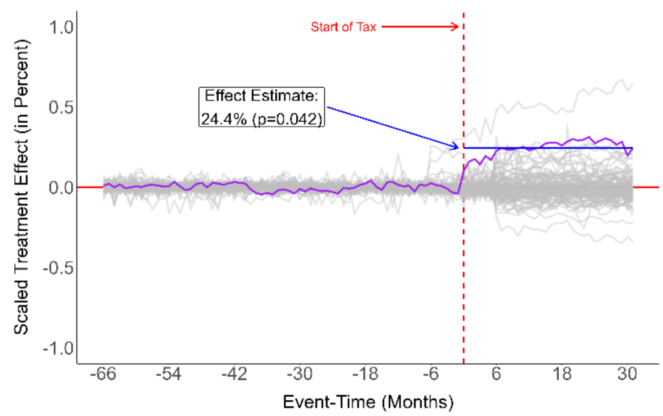
(a) 803 (Boulder)



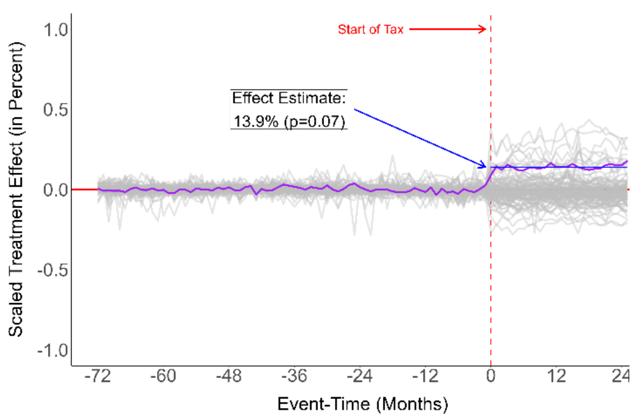
(b) 941 (San Francisco)



(c) 191 (Philadelphia)

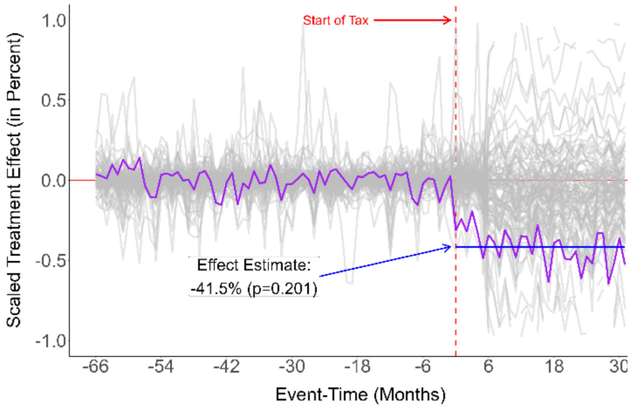


(d) 946 (Oakland)



(e) 981 (Seattle)

eFigure 6. Augmented Synthetic Control Estimates for Individual Locality Changes in Volume Sales



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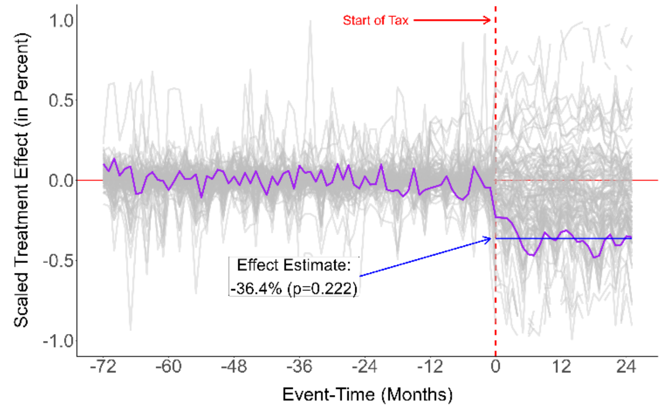
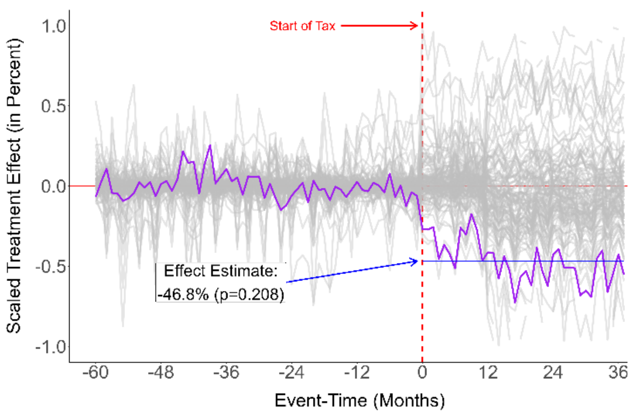
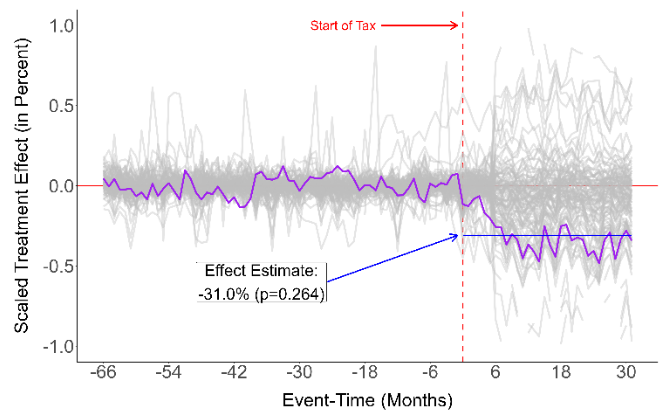


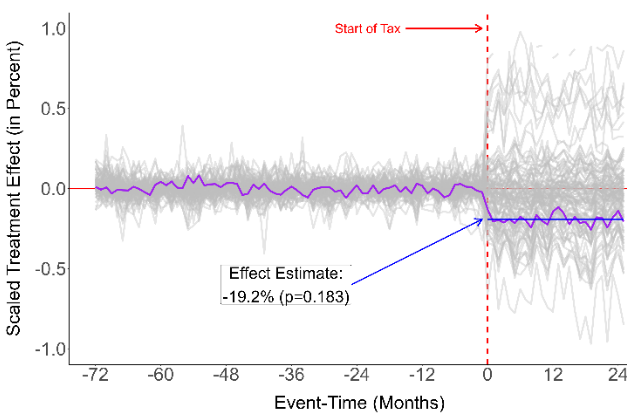
(b) 941 (San Francisco)



(c) 191 (Philadelphia)

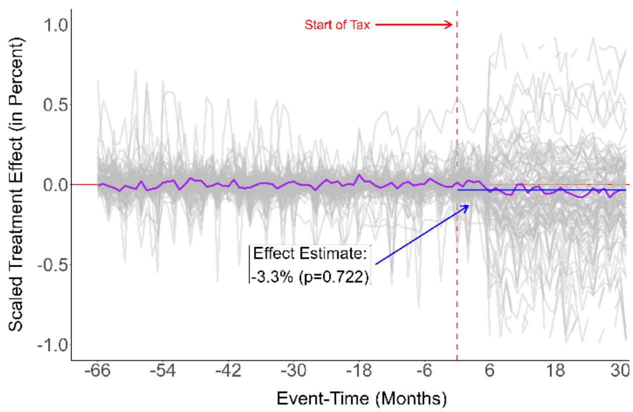


(d) 946 (Oakland)

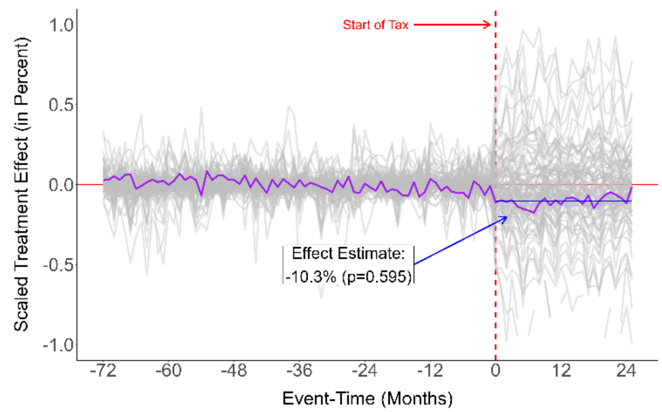


(e) 981 (Seattle)

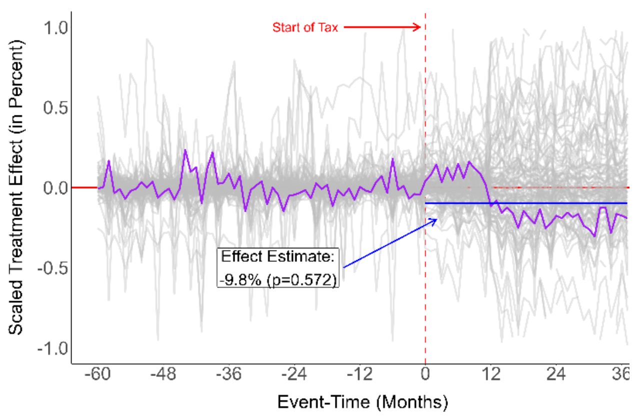
eFigure 7. Augmented Synthetic Control Estimates of Individual Locality Changes in Volume Sales of SSB Products in Border Areas



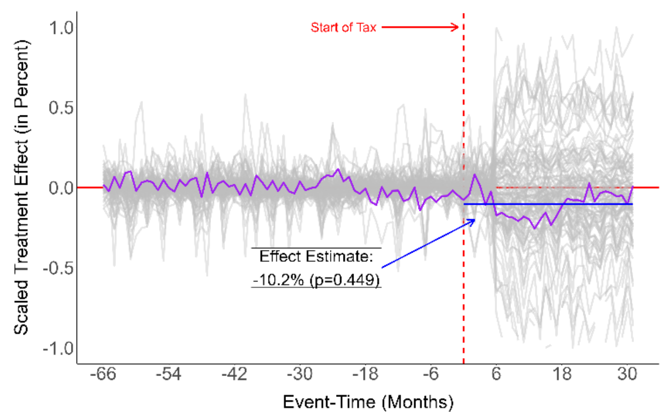
(a) 803 (Boulder)



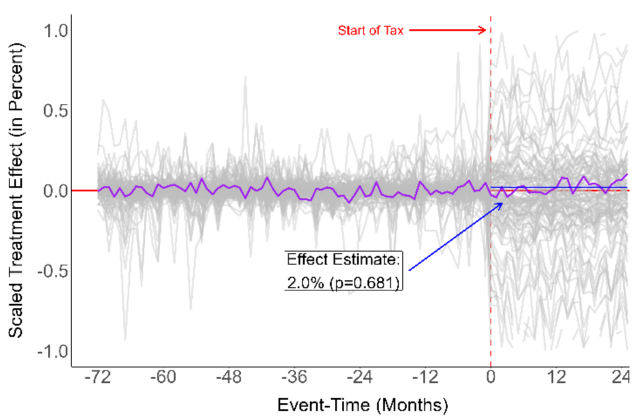
(b) 941 (San Francisco)



(c) 191 (Philadelphia)

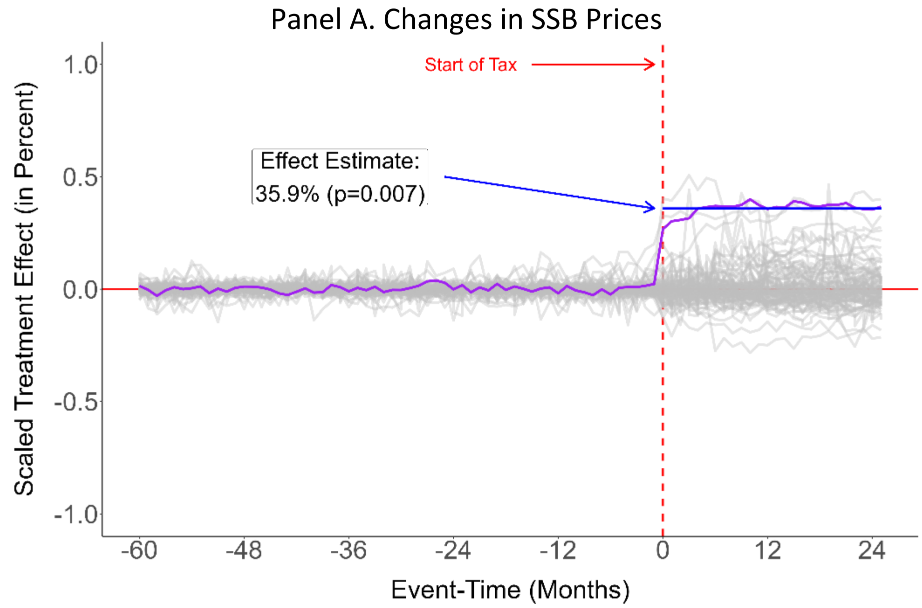


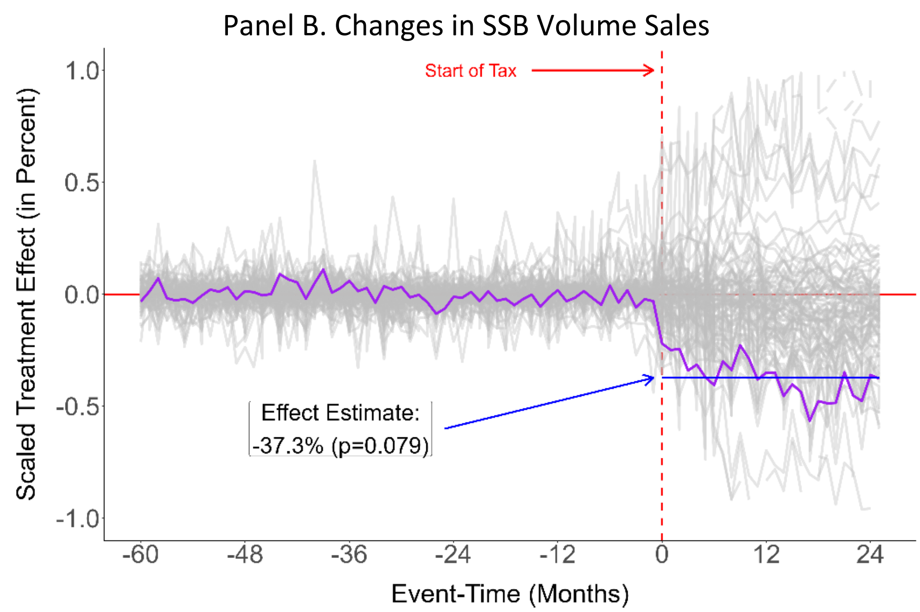
(d) 946 (Oakland)



(e) 981 (Seattle)

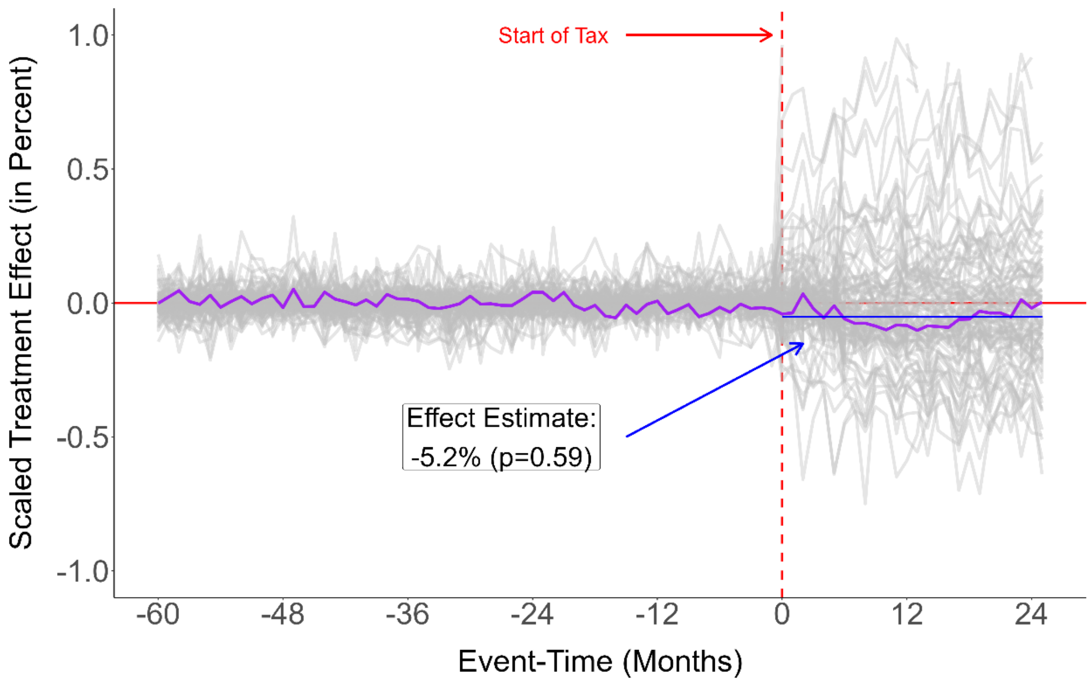
eFigure 8. Augmented Synthetic Control Estimates for Composite Changes in Price and Volume Sales of SSB Products (Population Weighted)





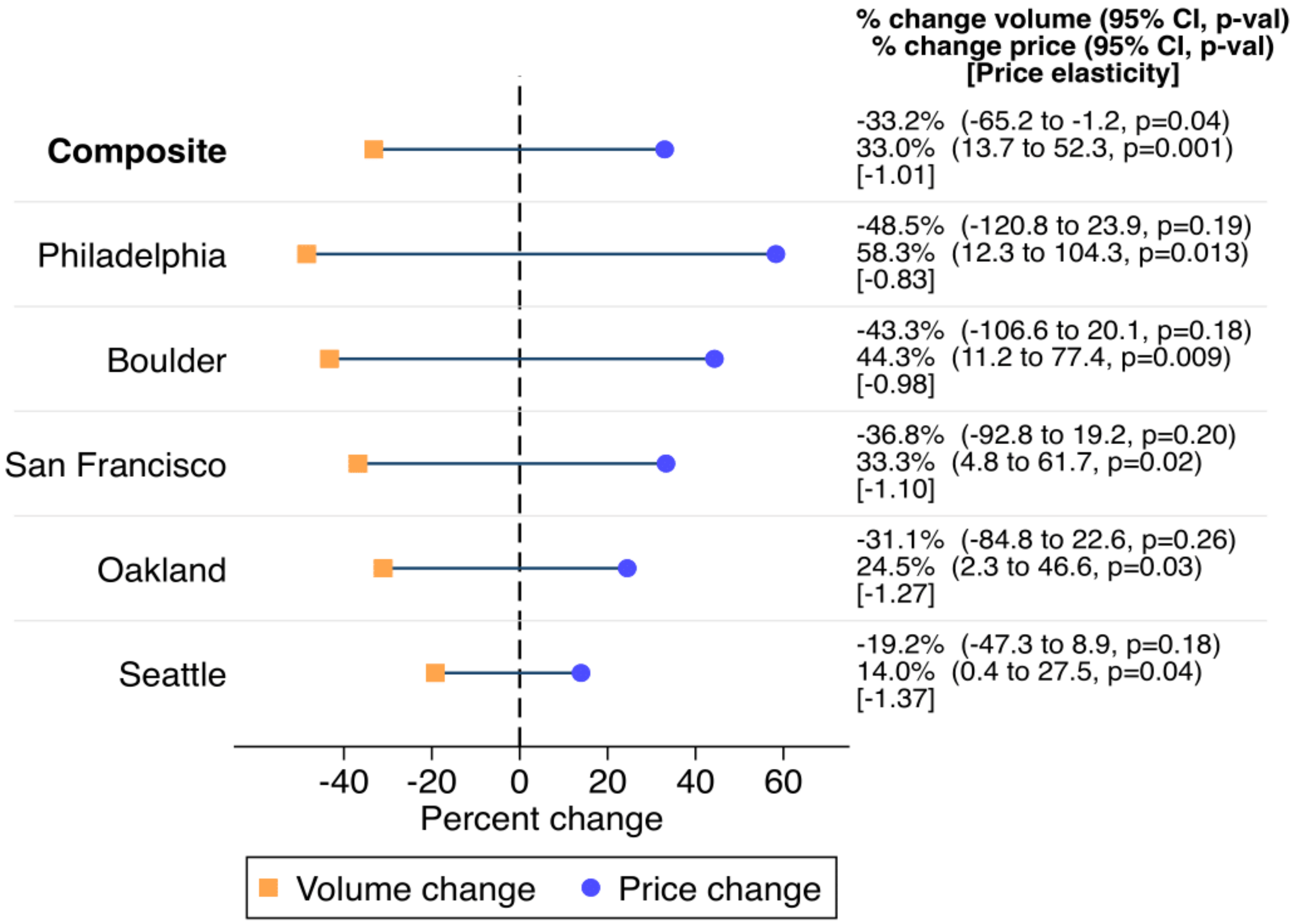
Note: Panel a) shows the % change in volume sold (in ounces), and panel b) the % change in shelf prices in response to implementing an excise SSB tax for the staggered adoption composite analysis. The bolded purple line represents the composite treated unit, while the lightly shaded grey lines represent in-space placebo estimates from the donor pool. The composite effect is explicitly weighted by the population of each individual treated city. % changes are calculated with respect to the population-weighted average of the pre-treatment means of each of the five treated localities. The composite effect size estimates and p-values are provided in the designated box of each panel.

eFigure 9. Augmented Synthetic Control Estimates of Composite Changes in Volume Sales of SSB Products in Border Areas (Population Weighted)



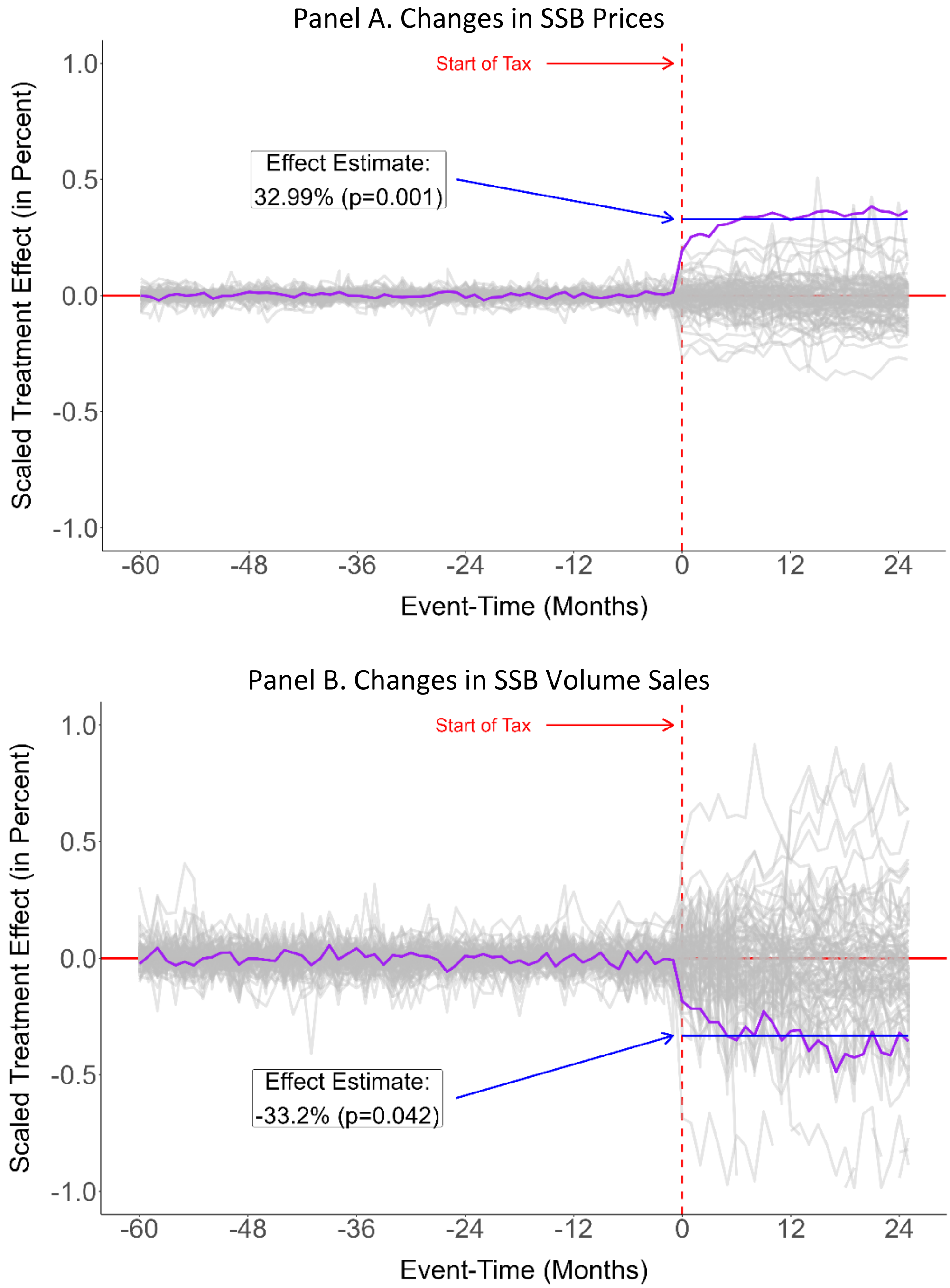
Note: This figure shows the staggered adoption composite analysis % change in volume sold (in ounces) in immediately adjacent bordering 3-digit zip codes in response to implementing an excise SSB tax in the five treated zip codes. The bolded purple line represents the composite adjacent border unit, while the lightly shaded grey lines represent in-space placebo estimates from the donor pool. The composite effect is explicitly weighted by the population of each individual treated city. % changes are calculated with respect to the population-weighted average of the pre-treatment means of each of the twelve adjacent border localities. The composite effect size estimates and p-values are provided in the designated box.

eFigure 10. Composite and Individual Locality Demand Elasticity Estimates (Urbanicity > 0.85)



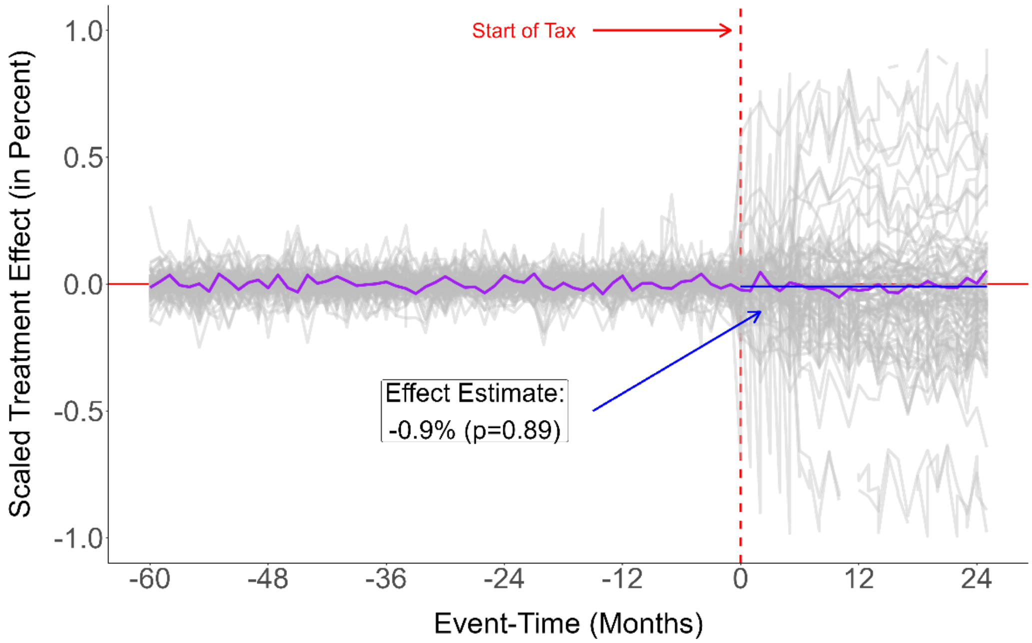
Note: This plot shows the % change in volume sold (in ounces) and % change in price for the augmented synthetic control composite analysis, and the same information for augmented synthetic control analyses of each of the five treated localities individually. Price elasticities of demand are provided in brackets, and 95% confidence intervals and p-values for each estimation are provided in parentheses.

eFigure 11. Augmented Synthetic Control Estimates for Composite Changes in Price and Volume Sales of SSB Products (Urbanicity > 0.85)



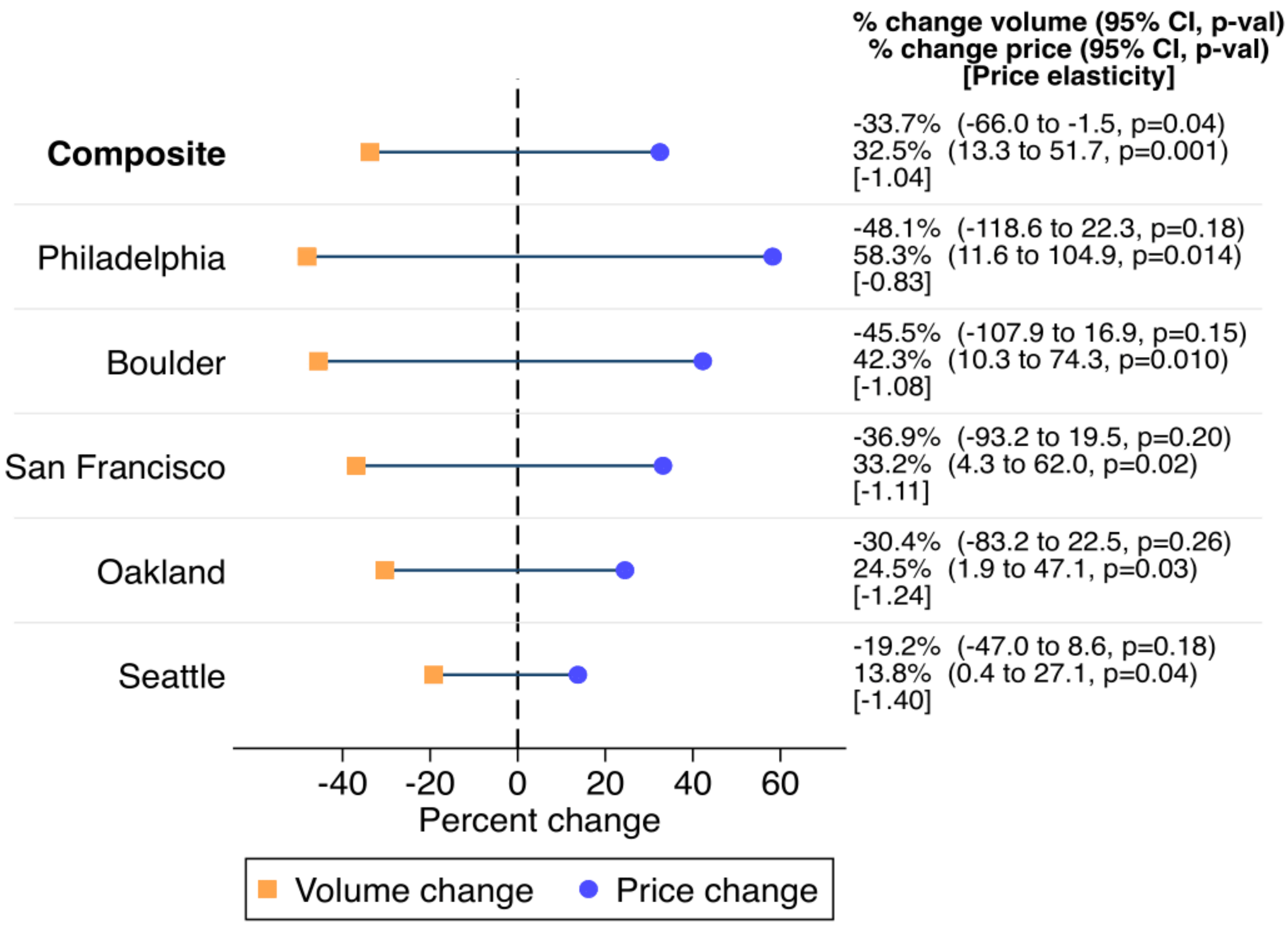
Note: Panel a) shows the % change in price and panel b) the % change in volume in response to the implementation of an excise SSB tax for the composite analysis. The bolded purple line represents the composite treated unit, while the lightly shaded grey lines represent in-space placebo estimates from the donor pool. % changes are calculated with respect to the average of the pre-treatment means of each of the five treated localities. The average composite effect estimates and p-values are provided in the designated box of each panel.

eFigure 12. Augmented Synthetic Control Estimates of Composite Changes in Volume Sales of SSB Products in Border Areas (Urbanicity > 0.85)



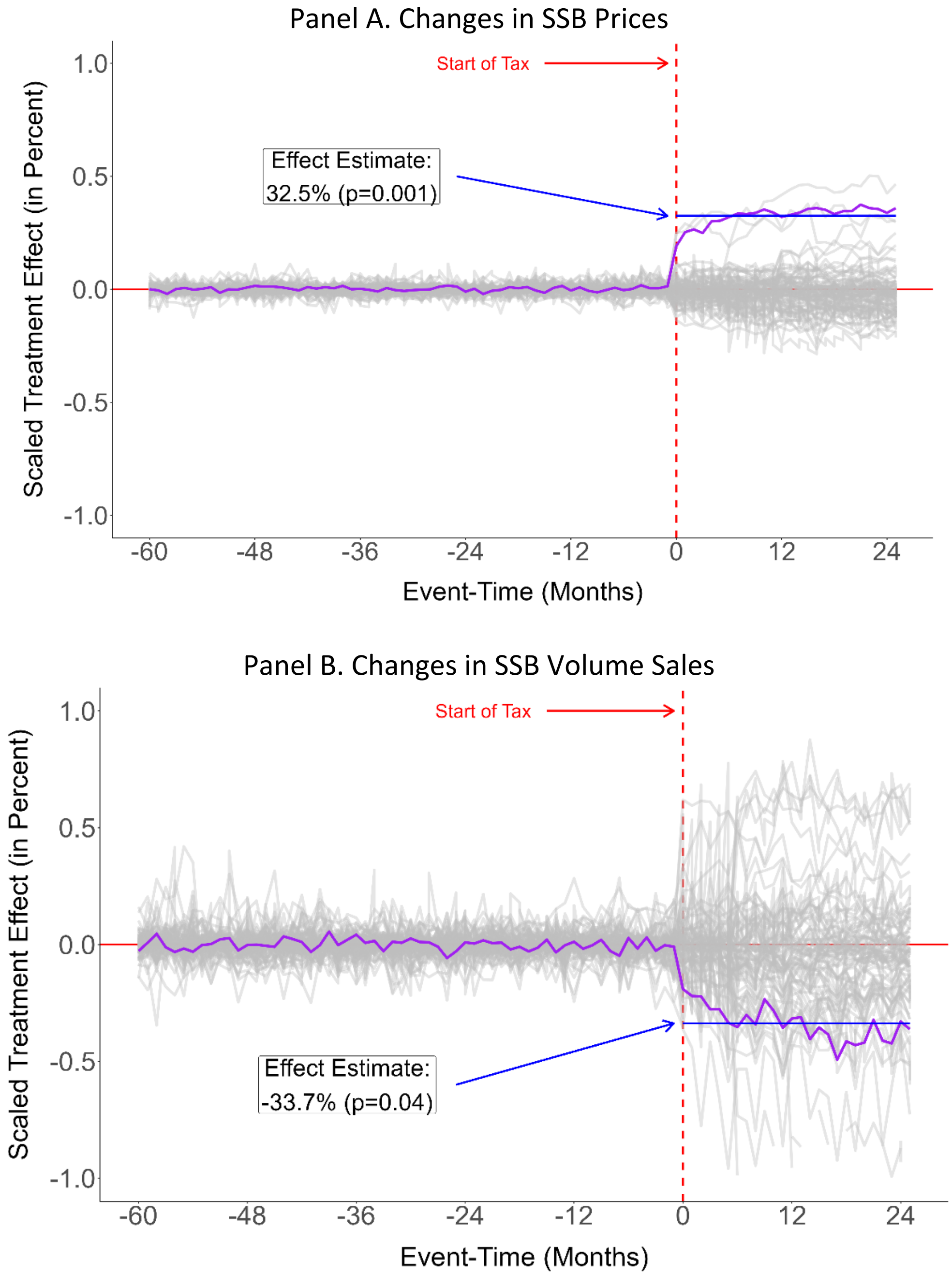
Note: This figure shows the composite analysis % change in volume sold in immediately adjacent bordering 3-digit zip codes in response to the implementation of an excise SSB tax in the five treated zip codes. The bolded purple line represents the composite adjacent border unit, while the lightly shaded grey lines represent in-space placebo estimates from the donor pool. % changes are calculated with respect to the average of the pre-treatment means of each of the twelve adjacent border localities. The average composite effect estimates and p-values are provided in the designated box.

eFigure 13. Composite and Individual Locality Demand Elasticity Estimates (Urbanicity > 0.9)



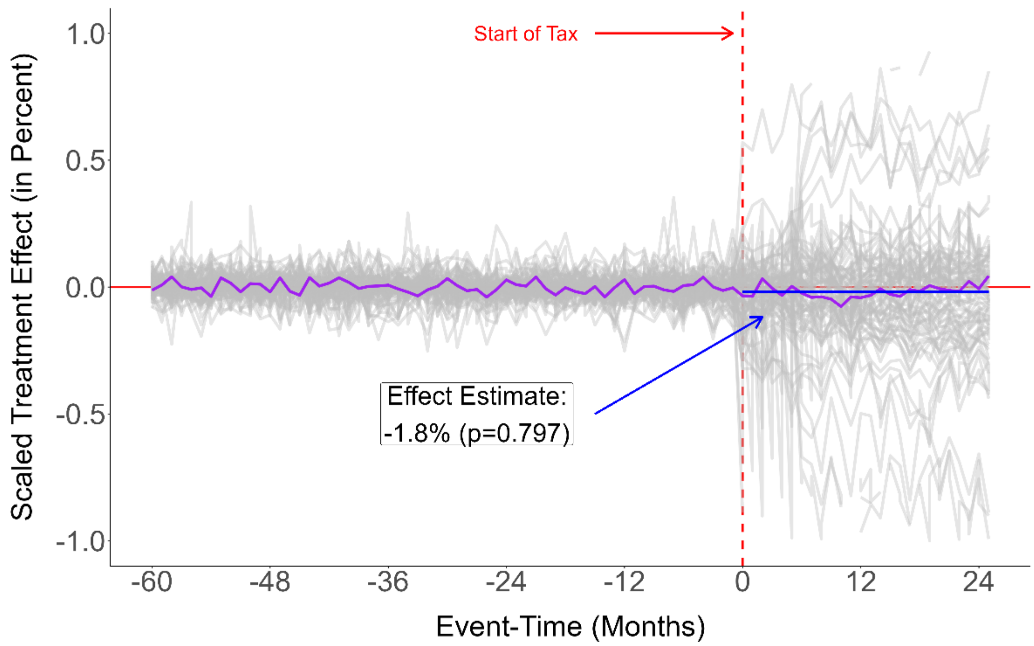
Note: This plot shows the % change in volume sold (in ounces) and % change in price for the augmented synthetic control staggered adoption composite analysis, and the same information for augmented synthetic control analyses of each of the five treated localities individually. Price elasticities of demand are provided in brackets, and 95% confidence intervals and p-values for each estimation are provided in parentheses.

eFigure 14. Augmented Synthetic Control Estimates for Composite Changes in Price and Volume Sales of SSB Products (Urbanicity > 0.9)



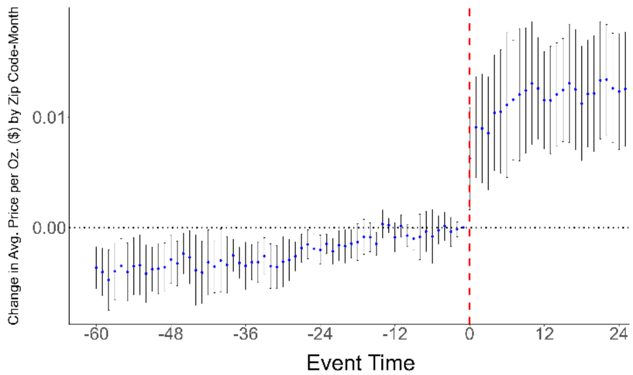
Note: Panel a) shows the % change in price and panel b) the % change in volume sold (in ounces) in response to the implementation of an excise SSB tax for the composite analysis. The bolded purple line represents the composite treated unit, while the lightly shaded grey lines represent in-space placebo estimates from the donor pool. % changes are calculated with respect to the average of the pre-treatment means of each of the five treated localities. The average composite effect estimates and p-values are provided in the designated box of each panel.

eFigure 15. Augmented Synthetic Control Estimates of Composite Changes in Volume Sales of SSB Products in Border Areas (Urbanicity > 0.9)

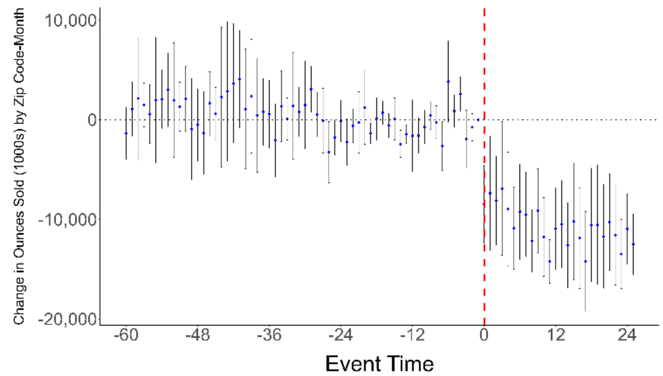


Note: This figure shows the composite analysis % change in volume sold in immediately adjacent bordering 3-digit zip codes in response to the implementation of an excise SSB tax in the five treated zip codes. The bolded purple line represents the composite adjacent border unit, while the lightly shaded grey lines represent in-space placebo estimates from the donor pool. % changes are calculated with respect to the average of the pre-treatment means of each of the twelve adjacent border localities. The average composite effect estimates and p-values are provided in the designated box.

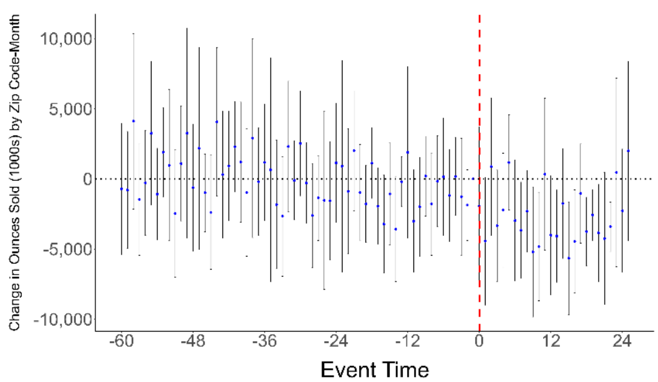
eFigure 16. TWFE Estimates of Composite Changes in Prices, Volume Sales, and Border Volume Sales



Panel A. Changes in SSB Prices



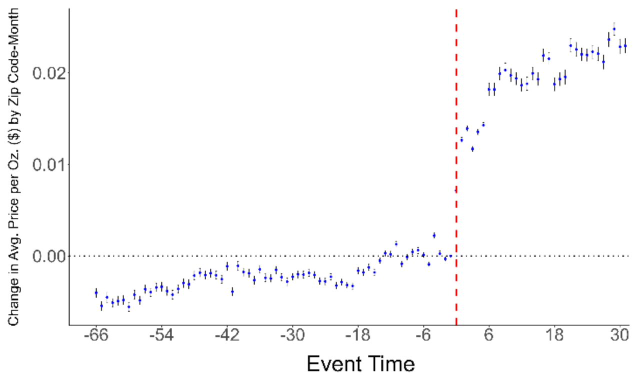
Panel B. Changes in SSB Volume Sales



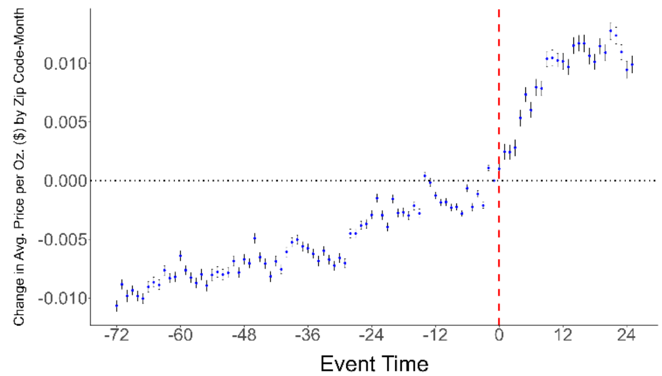
Panel C. Changes in Border SSB Volume Sales

Note: All point estimates should be interpreted relative to the omitted event-time period (-1). 95% CIs are depicted with each point estimate. The red dashed line indicates timing of policy enactment.

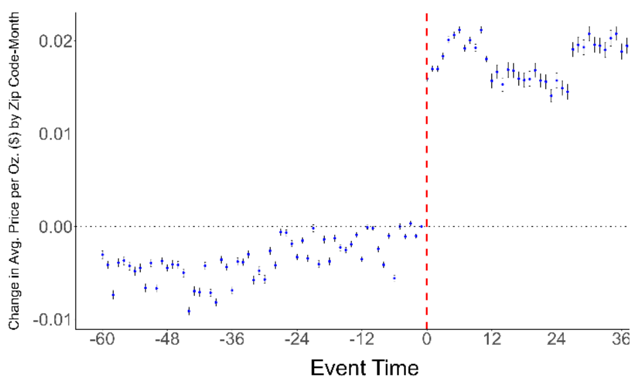
eFigure 17. TWFE Estimates of Individual Locality Changes in Prices



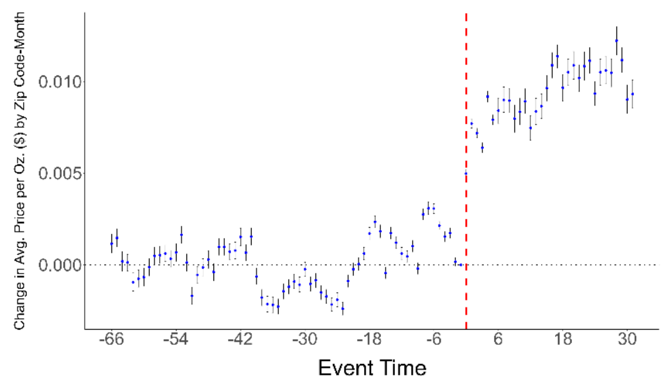
(a) 803 (Boulder)



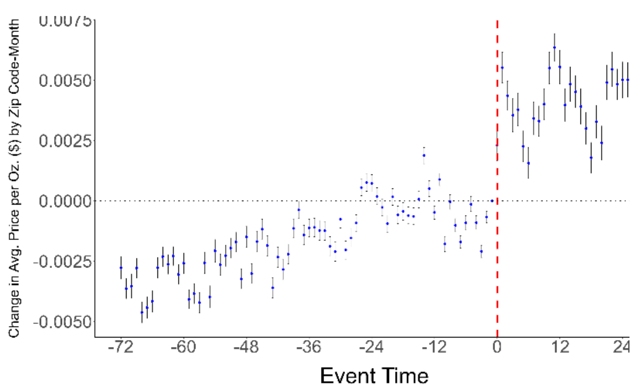
(b) 941 (San Francisco)



(c) 191 (Philadelphia)



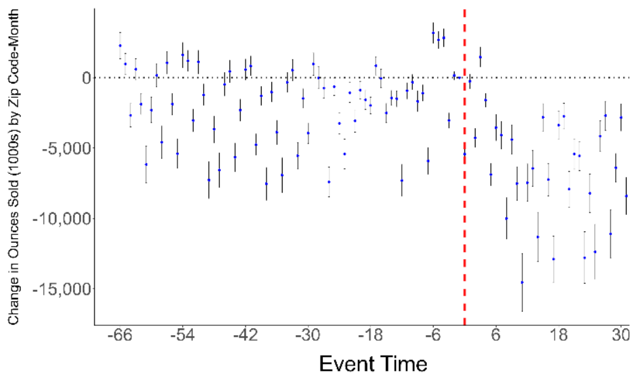
(d) 946 (Oakland)



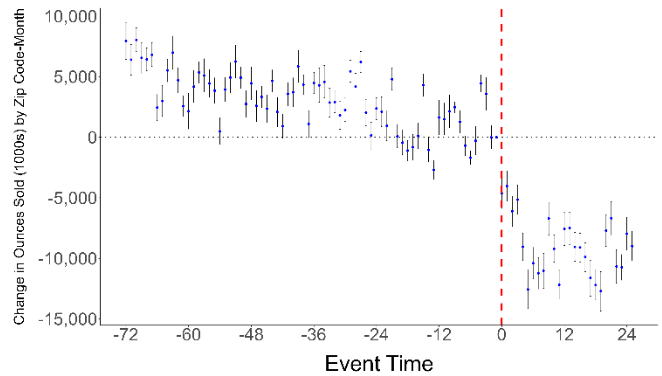
(e) 981 (Seattle)

Note: All point estimates should be interpreted relative to the omitted event-time period (-1). 95% CIs are depicted with each point estimate. The red dashed line indicates timing of policy enactment.

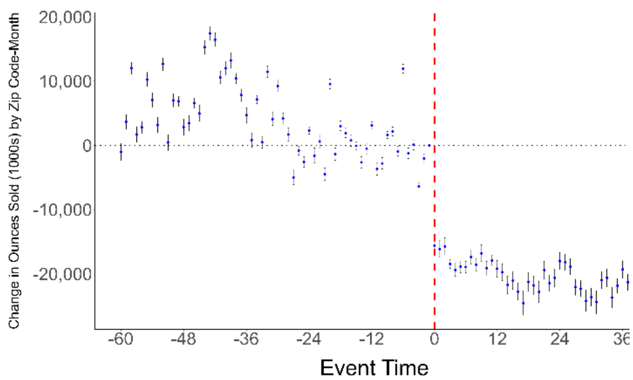
eFigure 18. TWFE Estimates of Individual Locality Changes in Volume Sales



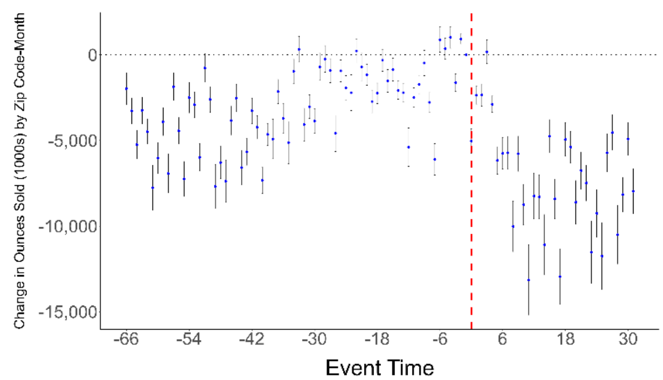
(a) 803 (Boulder)



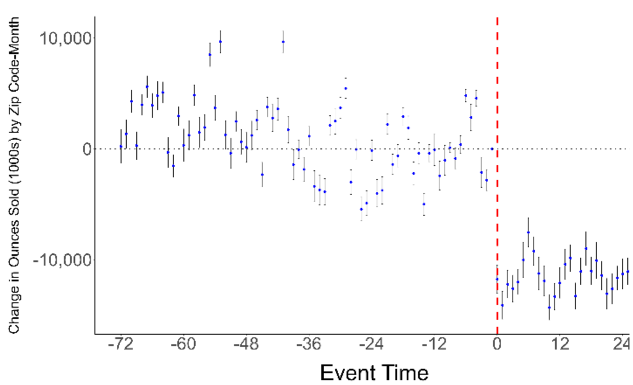
(b) 941 (San Francisco)



(c) 191 (Philadelphia)



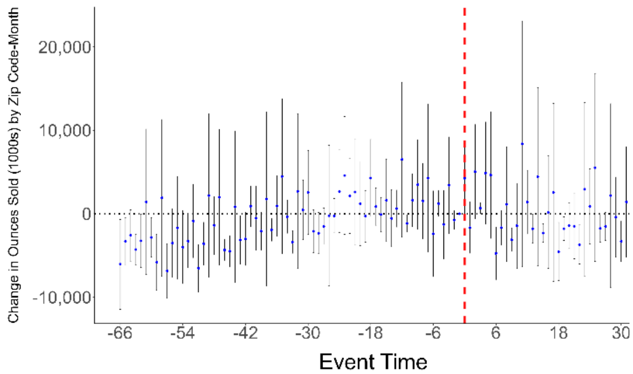
(d) 946 (Oakland)



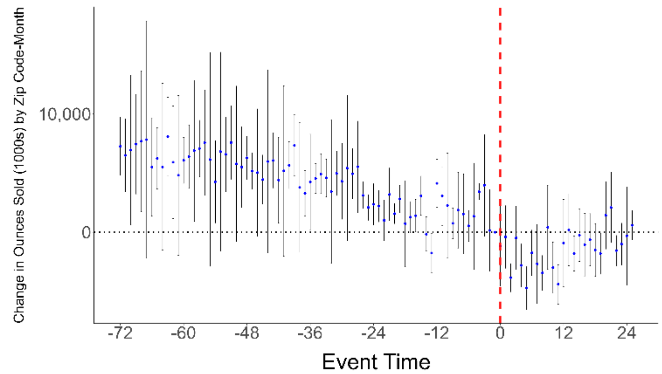
(e) 981 (Seattle)

Note: All point estimates should be interpreted relative to the omitted event-time period (-1). 95% CIs are depicted with each point estimate. The red dashed line indicates timing of policy enactment.

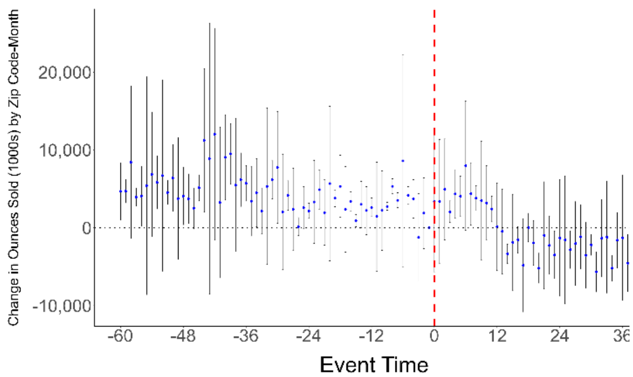
eFigure 19. TWFE Estimates of Individual Locality Changes in Volume Sales of SSB Products in Border Areas



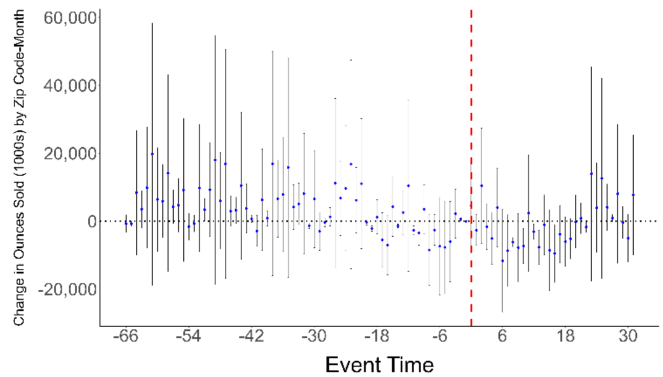
(a) 803 (Boulder)



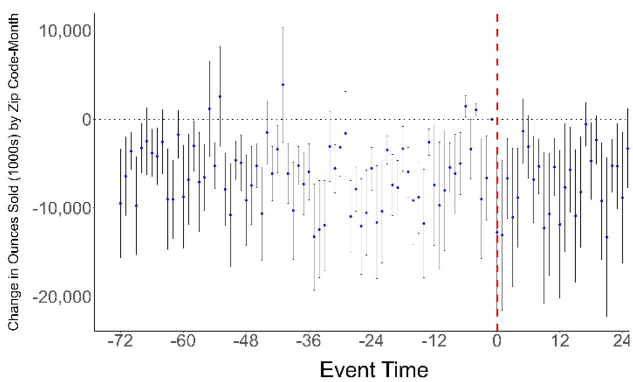
(b) 941 (San Francisco)



(c) 191 (Philadelphia)



(d) 946 (Oakland)



(e) 981 (Seattle)

Note: All point estimates should be interpreted relative to the omitted event-time period (-1). 95% CIs are depicted with each point estimate. The red dashed line indicates timing of policy enactment.