

```
name: <unnamed>
log: C:\Users\XuQi\Desktop\第12章.smcl
log type: smcl
opened on: 21 Jul 2023, 13:00:55

. do "C:\Users\XuQi\AppData\Local\Temp\STD398c_000000.tmp"

. *打开数据
. use "C:\Users\XuQi\Desktop\smoking.dta", clear
(Tobacco Sales in 39 US States)

.
. *绘图
. twoway (line cigsale year if state==3, xline(1988, lpattern(shortdash) lcolor(black))) || (line cigsale year if state==1, lpat

.
. bysort year : egen mcigsale=mean(cigsale) if state!=3
(31 missing values generated)

. twoway (line cigsale year if state==3, xline(1988, lpattern(shortdash) lcolor(black))) || (line mcigsale year, lpattern(dash))

.
. *设置为追踪数据
. xtset state year
      panel variable:  state (strongly balanced)
      time variable:  year, 1970 to 2000
                  delta: 1 unit

.
. *使用synth
. synth cigsale cigsale(1975) cigsale(1980) cigsale(1988) beer(1984(1)1988) lnincome retprice age15to24, trunit(3) trperiod(1989
```

Synthetic Control Method for Comparative Case Studies

First Step: Data Setup

Data Setup successful

Treated Unit:	California
Control Units:	Alabama, Arkansas, Colorado, Connecticut, Delaware, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming
Dependent Variable:	cigsale
MSPE minimized for periods:	1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988
Results obtained for periods:	1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989
Predictors:	cigsale(1975) cigsale(1980) cigsale(1988) beer(1984(1)1988) lnincome retprice age15to24

Unless period is specified  
predictors are averaged over: 1980 1981 1982 1983 1984 1985 1986 1987 1988

Second Step: Run Optimization

Nested optimization requested  
Starting nested optimization module  
Optimization done

Optimization done

Third Step: Obtain Results

Loss: Root Mean Squared Prediction Error

RMSPE	1.756494
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Unit Weights:

Co_No	Unit_Weight
Alabama	0
Arkansas	0
Colorado	.162
Connecticut	.068
Delaware	0
Georgia	0
Idaho	0
Illinois	0
Indiana	0
Iowa	0
Kansas	0
Kentucky	0
Louisiana	0
Maine	0
Minnesota	0
Mississippi	0
Missouri	0
Montana	.199
Nebraska	0
Nevada	.235
New Hampshire	0
New Mexico	0
North Carolina	0
North Dakota	0
Ohio	0
Oklahoma	0
Pennsylvania	0
Rhode Island	0
South Carolina	0
South Dakota	0
Tennessee	0
Texas	0
Utah	.335
Vermont	0
Virginia	0
West Virginia	0
Wisconsin	0
Wyoming	0

Predictor Balance:

	Treated	Synthetic
cigsale(1975)	127.1	126.9469
cigsale(1980)	120.2	120.3415
cigsale(1988)	90.1	91.556
beer(1984(1)1988)	24.28	24.18258
lnincome	10.07656	9.849172
retprice	89.42222	89.32609
age15to24	.1735324	.1733873

.  
.  
. \*使用synth2  
. synth2 cigsale cigsale(1975) cigsale(1980) cigsale(1988) beer(1984(1)1988) lnincome retprice age15to24, trunit(3) trperiod(1984-1988)  
Fitting results in the pretreatment periods:

Treated Unit	: California	Treatment Time	:	1989
Number of Control Units	= 38	Root Mean Squared Error	=	1.75649
Number of Covariates	= 7	R-squared	=	0.97402

Covariate balance in the pretreatment periods:

Covariate	V.weight	Treated	Synthetic Control Value	Bias	Average Control Value	Bias
cigsale(1975)	0.8523	127.1000	126.9469	-0.12%	136.9316	7.74%
cigsale(1980)	0.0224	120.2000	120.3415	0.12%	138.0895	14.88%
cigsale(1988)	0.0157	90.1000	91.5560	1.62%	113.8237	26.33%
beer(1984(1)1988)	0.0085	24.2800	24.1826	-0.40%	23.6553	-2.57%
lnincome	0.0002	10.0766	9.8492	-2.26%	9.8292	-2.45%
retprice	0.0870	89.4222	89.3261	-0.11%	87.2661	-2.41%
age15to24	0.0138	0.1735	0.1734	-0.08%	0.1725	-0.59%

Note: "V.weight" is the optimal covariate weight in the diagonal of V matrix.  
"Synthetic Control" is the weighted average of donor units with optimal weights.  
"Average Control" is the simple average of all control units with equal weights.

Optimal Unit Weights:

Unit	U.weight
Utah	0.3350
Nevada	0.2350
Montana	0.1990
Colorado	0.1620
Connecticut	0.0680

Note: The unit Alabama Arkansas Delaware Georgia Idaho Illinois Indiana Iowa Kansas Kentucky Louisiana Maine Minnesota Mississippi SouthDakota Tennessee Texas Vermont Virginia WestVirginia Wisconsin Wyoming in the donor pool get a weight of 0.

Prediction results in the posttreatment periods:

Time	Actual Outcome	Synthetic Outcome	Treatment Effect
1989	82.4000	89.8817	-7.4817
1990	77.8000	87.3906	-9.5906
1991	68.7000	82.0701	-13.3701
1992	67.5000	81.4910	-13.9910
1993	63.4000	81.0765	-17.6765
1994	58.6000	80.6098	-22.0098
1995	56.4000	78.3682	-21.9682
1996	54.5000	77.3579	-22.8579
1997	53.8000	77.5839	-23.7839
1998	52.3000	74.2538	-21.9538
1999	47.2000	73.4468	-26.2468
2000	41.6000	67.2422	-25.6422
Mean	60.3500	79.2310	-18.8810

Note: The average treatment effect over the posttreatment period is -18.8810.

Finished.

.  
. \*安慰剂检验  
. synth2 cigsale cigsale(1975) cigsale(1980) cigsale(1988) beer(1984(1)1988) lnincome retprice age15to24, trunit(3) trperiod(1989-2000)  
Fitting results in the pretreatment periods:

Treated Unit	:	California	Treatment Time	:	1989
Number of Control Units	=	38	Root Mean Squared Error	=	1.77158
Number of Covariates	=	7	R-squared	=	0.97360

Covariate balance in the pretreatment periods:

Covariate	V.weight	Treated	Synthetic Control Value	Bias	Average Control Value	Bias
cigsale(1975)	0.7378	127.1000	126.9642	-0.11%	136.9316	7.74%
cigsale(1980)	0.1010	120.2000	120.5076	0.26%	138.0895	14.88%
cigsale(1988)	0.0673	90.1000	91.6795	1.75%	113.8237	26.33%
beer(1984(1)1988)	0.0232	24.2800	24.1733	-0.44%	23.6553	-2.57%
lnincome	0.0007	10.0766	9.8626	-2.12%	9.8292	-2.45%
retprice	0.0561	89.4222	89.3597	-0.07%	87.2661	-2.41%
age15to24	0.0139	0.1735	0.1736	0.06%	0.1725	-0.59%

Note: "V.weight" is the optimal covariate weight in the diagonal of V matrix.  
"Synthetic Control" is the weighted average of donor units with optimal weights.  
"Average Control" is the simple average of all control units with equal weights.

Optimal Unit Weights:

Unit	U.weight
Utah	0.3310
Nevada	0.2310
Montana	0.1870
Colorado	0.1780
Connecticut	0.0700
NewMexico	0.0030

Note: The unit Alabama Arkansas Delaware Georgia Idaho Illinois Indiana Iowa Kansas Kentucky Louisiana Maine Minnesota Mississippi Tennessee Texas Vermont Virginia WestVirginia Wisconsin Wyoming in the donor pool get a weight of 0.

Prediction results in the posttreatment periods:

Time	Actual Outcome	Synthetic Outcome	Treatment Effect
1989	82.4000	89.9129	-7.5129
1990	77.8000	87.4052	-9.6052
1991	68.7000	82.2256	-13.5256
1992	67.5000	81.5858	-14.0858
1993	63.4000	81.1701	-17.7701
1994	58.6000	80.6908	-22.0908
1995	56.4000	78.3966	-21.9966
1996	54.5000	77.3770	-22.8770
1997	53.8000	77.5447	-23.7447
1998	52.3000	74.2438	-21.9438
1999	47.2000	73.4639	-26.2639
2000	41.6000	67.2728	-25.6728
Mean	60.3500	79.2741	-18.9241

Note: The average treatment effect over the posttreatment period is -18.9241.

Implementing placebo test using fake treatment unit Alabama...Arkansas...Colorado...Connecticut...Delaware...Georgia...Idaho...Illinois...Indiana...Iowa...Kansas...Kentucky...Louisiana...Maine...Maryland...Massachusetts...Michigan...Minnesota...Mississippi...Missouri...Montana...Nebraska...Nevada...NewHampshire...NewMexico...NorthCarolina...NorthDakota...Ohio...Oklahoma...Pennsylvania...RhodeIsland...SouthCarolina...SouthDakota...Tennessee...Texas...Utah...Vermont...Virginia...WestVirginia...Wisconsin...Wyoming

In-space placebo test results using fake treatment units:

Unit	Pre MSPE	Post MSPE	Post/Pre MSPE	Pre MSPE of Fake Unit/ Pre MSPE of Treated Unit
California	3.1385	394.6057	125.7315	1.0000
Alabama	4.4866	11.8215	2.6349	1.4295
Arkansas	4.5489	27.1172	5.9613	1.4494
Colorado	20.1202	64.6477	3.2131	6.4108
Connecticut	24.7935	64.3412	2.5951	7.8999
Delaware	60.8949	613.7822	10.0794	19.4027
Georgia	1.5266	119.9796	78.5916	0.4864
Idaho	5.5168	38.7863	7.0305	1.7578
Illinois	3.3826	20.2469	5.9856	1.0778
Indiana	14.2860	483.5229	33.8459	4.5519
Iowa	13.1473	22.8504	1.7380	4.1891
Kansas	13.8659	13.9222	1.0041	4.4180
Kentucky	432.1076	1479.6058	3.4242	137.6806
Louisiana	2.0242	92.7390	45.8151	0.6450
Maine	9.6540	149.5972	15.4959	3.0760
Minnesota	17.3584	16.5625	0.9541	5.5308
Mississippi	4.1186	30.3410	7.3668	1.3123
Missouri	1.1516	76.9955	66.8614	0.3669
Montana	5.2862	54.8978	10.3852	1.6843
Nebraska	3.8430	20.7162	5.3906	1.2245
Nevada	41.3819	84.0794	2.0318	13.1853
NewHampshire	3436.5977	134.9018	0.0393	1094.9884
NewMexico	5.0179	63.0000	12.5550	1.5988
NorthCarolina	81.3899	57.3684	0.7049	25.9329
NorthDakota	8.7058	91.8695	10.5527	2.7739
Ohio	3.0070	11.8692	3.9472	0.9581
Oklahoma	4.9063	253.8599	51.7416	1.5633
Pennsylvania	2.8010	6.9518	2.4819	0.8925
RhodeIsland	65.5660	180.4701	2.7525	20.8910
SouthCarolina	2.2915	42.9495	18.7427	0.7301
SouthDakota	8.4642	25.1291	2.9689	2.6969
Tennessee	5.2043	123.3097	23.6940	1.6582
Texas	4.6900	231.9461	49.4555	1.4944
Utah	593.7643	223.2758	0.3760	189.1886
Vermont	14.1665	138.2022	9.7556	4.5138
Virginia	5.2522	178.1813	33.9251	1.6735
WestVirginia	7.7211	260.9561	33.7977	2.4601
Wisconsin	5.4239	47.8065	8.8141	1.7282
Wyoming	90.8381	31.6591	0.3485	28.9434

Note: (1) Using all control units, the probability of obtaining a post/pretreatment MSPE ratio as large as California's is 0.0256  
(2) Excluding control units with pretreatment MSPE 2 times larger than the treated unit, the probability of obtaining a post/pretreatment MSPE ratio as large as California's is 0.0256  
(3) The pointwise p-values below are computed by excluding control units with pretreatment MSPE 2 times larger than the treated unit  
(4) There are total 19 units with pretreatment MSPE 2 times larger than the treated unit, including Colorado Connecticut Delaware Georgia Idaho Illinois Indiana Iowa Kansas Kentucky Louisiana Maine Maryland Massachusetts Michigan Minnesota Mississippi Missouri Montana Nebraska Nevada NewHampshire NewMexico NorthCarolina NorthDakota Ohio Oklahoma Pennsylvania RhodeIsland SouthCarolina SouthDakota Tennessee Texas Utah Vermont WestVirginia Wisconsin Wyoming

In-space placebo test results using fake treatment units (continued, cutoff = 2):

Time	Treatment Effect	p-value of Treatment Effect		
		Two-sided	Right-sided	Left-sided
1989	-7.5129	0.0500	1.0000	0.0500
1990	-9.6052	0.0500	1.0000	0.0500
1991	-13.5256	0.1500	0.9000	0.1500
1992	-14.0858	0.1000	0.9500	0.1000
1993	-17.7701	0.0500	1.0000	0.0500
1994	-22.0908	0.0500	1.0000	0.0500
1995	-21.9966	0.0500	1.0000	0.0500
1996	-22.8770	0.0500	1.0000	0.0500
1997	-23.7447	0.0500	1.0000	0.0500
1998	-21.9438	0.1000	0.9500	0.1000
1999	-26.2639	0.0500	1.0000	0.0500
2000	-25.6728	0.0500	1.0000	0.0500

Note: (1) The two-sided p-value of the treatment effect for a particular period is defined as the frequency that the absolute value of the treatment effect is greater than or equal to the observed treatment effect.  
(2) The right-sided (left-sided) p-value of the treatment effect for a particular period is defined as the frequency that the treatment effect is greater (less) than or equal to the observed treatment effect.  
(3) If the estimated treatment effect is positive, then the right-sided p-value is recommended; whereas the left-sided p-value is recommended if the estimated treatment effect is negative.

Finished.

.  
. \*伪干预时间检验  
. synth2 cigsale cigsale(1975) cigsale(1980) cigsale(1988) beer(1984(1)1988) lnincome retprice age15to24, trunit(3) trperiod(1989-2000)  
Fitting results in the pretreatment periods:

Treated Unit	: California	Treatment Time	:	1989
Number of Control Units	= 38	Root Mean Squared Error	=	1.75649
Number of Covariates	= 7	R-squared	=	0.97402

Covariate balance in the pretreatment periods:

Covariate	V.weight	Treated	Synthetic Control Value	Bias	Average Control Value	Bias
cigsale(1975)	0.8523	127.1000	126.9469	-0.12%	136.9316	7.74%
cigsale(1980)	0.0224	120.2000	120.3415	0.12%	138.0895	14.88%
cigsale(1988)	0.0157	90.1000	91.5560	1.62%	113.8237	26.33%
beer(1984(1)1988)	0.0085	24.2800	24.1826	-0.40%	23.6553	-2.57%
lnincome	0.0002	10.0766	9.8492	-2.26%	9.8292	-2.45%
retprice	0.0870	89.4222	89.3261	-0.11%	87.2661	-2.41%
age15to24	0.0138	0.1735	0.1734	-0.08%	0.1725	-0.59%

Note: "V.weight" is the optimal covariate weight in the diagonal of V matrix.  
"Synthetic Control" is the weighted average of donor units with optimal weights.  
"Average Control" is the simple average of all control units with equal weights.

Optimal Unit Weights:

Unit	U.weight
Utah	0.3350
Nevada	0.2350
Montana	0.1990
Colorado	0.1620
Connecticut	0.0680

Note: The unit Alabama Arkansas Delaware Georgia Idaho Illinois Indiana Iowa Kansas Kentucky Louisiana Maine Minnesota Mississippi Missouri Montana Nebraska Nevada New Hampshire New Jersey New Mexico New York North Carolina North Dakota Ohio Oklahoma Oregon Pennsylvania Rhode Island South Carolina SouthDakota Tennessee Texas Vermont Virginia WestVirginia Wisconsin Wyoming in the donor pool get a weight of 0.

Prediction results in the posttreatment periods:

Time	Actual Outcome	Synthetic Outcome	Treatment Effect
1989	82.4000	89.8817	-7.4817
1990	77.8000	87.3906	-9.5906
1991	68.7000	82.0701	-13.3701
1992	67.5000	81.4910	-13.9910
1993	63.4000	81.0765	-17.6765
1994	58.6000	80.6098	-22.0098
1995	56.4000	78.3682	-21.9682
1996	54.5000	77.3579	-22.8579
1997	53.8000	77.5839	-23.7839
1998	52.3000	74.2538	-21.9538
1999	47.2000	73.4468	-26.2468
2000	41.6000	67.2422	-25.6422
Mean	60.3500	79.2310	-18.8810

Note: The average treatment effect over the posttreatment period is -18.8810.

Implementing placebo test using fake treatment time **1985...**

In-time placebo test results using fake treatment time **1985:**

Time	Actual Outcome	Synthetic Outcome	Treatment Effect
1985	<b>102.8000</b>	<b>106.1262</b>	<b>-3.3262</b>
1986	<b>99.7000</b>	<b>103.2850</b>	<b>-3.5850</b>
1987	<b>97.5000</b>	<b>106.1524</b>	<b>-8.6524</b>
1988	<b>90.1000</b>	<b>98.4873</b>	<b>-8.3873</b>
1989	<b>82.4000</b>	<b>96.5237</b>	<b>-14.1237</b>
1990	<b>77.8000</b>	<b>91.9127</b>	<b>-14.1127</b>
1991	<b>68.7000</b>	<b>83.7156</b>	<b>-15.0156</b>
1992	<b>67.5000</b>	<b>81.4730</b>	<b>-13.9730</b>
1993	<b>63.4000</b>	<b>79.7911</b>	<b>-16.3911</b>
1994	<b>58.6000</b>	<b>77.9078</b>	<b>-19.3078</b>
1995	<b>56.4000</b>	<b>76.2193</b>	<b>-19.8193</b>
1996	<b>54.5000</b>	<b>75.2010</b>	<b>-20.7010</b>
1997	<b>53.8000</b>	<b>75.1958</b>	<b>-21.3958</b>
1998	<b>52.3000</b>	<b>71.9437</b>	<b>-19.6437</b>
1999	<b>47.2000</b>	<b>72.2260</b>	<b>-25.0260</b>
2000	<b>41.6000</b>	<b>67.1861</b>	<b>-25.5861</b>
Mean	<b>69.6437</b>	<b>85.2092</b>	<b>-15.5654</b>

Note: The average treatment effect over the posttreatment period is **-15.5654**.

Finished.

.  
. \*去除一个有影响的控制组个案  
. synth2 cigsale cigsale(1975) cigsale(1980) cigsale(1988) beer(1984(1)1988) lnincome retprice age15to24, trunit(3) trperiod(1989) fitdiagnostics  
Fitting results in the pretreatment periods:

Treated Unit	:	California	Treatment Time	:	1989
Number of Control Units	=	38	Root Mean Squared Error	=	1.75649
Number of Covariates	=	7	R-squared	=	0.97402

Covariate balance in the pretreatment periods:

Covariate	V.weight	Treated	Synthetic Control Value	Bias	Average Control Value	Bias
cigsale(1975)	0.8523	127.1000	126.9469	-0.12%	136.9316	7.74%
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lnincome	0.0002	10.0766	9.8492	-2.26%	9.8292	-2.45%
retprice	0.0870	89.4222	89.3261	-0.11%	87.2661	-2.41%
age15to24	0.0138	0.1735	0.1734	-0.08%	0.1725	-0.59%

Note: "V.weight" is the optimal covariate weight in the diagonal of V matrix.  
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Optimal Unit Weights:

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Nevada	0.2350
Montana	0.1990
Colorado	0.1620
Connecticut	0.0680

Note: The unit Alabama Arkansas Delaware Georgia Idaho Illinois Indiana Iowa Kansas Kentucky Louisiana Maine Minnesota Mississippi NorthDakota Oklahoma Oregon Pennsylvania RhodeIsland SouthDakota Tennessee Texas Vermont Virginia WestVirginia Wisconsin Wyoming in the donor pool get a weight of 0.

Prediction results in the posttreatment periods:

Time	Actual Outcome	Synthetic Outcome	Treatment Effect
1989	<b>82.4000</b>	<b>89.8817</b>	<b>-7.4817</b>
1990	<b>77.8000</b>	<b>87.3906</b>	<b>-9.5906</b>
1991	<b>68.7000</b>	<b>82.0701</b>	<b>-13.3701</b>
1992	<b>67.5000</b>	<b>81.4910</b>	<b>-13.9910</b>
1993	<b>63.4000</b>	<b>81.0765</b>	<b>-17.6765</b>
1994	<b>58.6000</b>	<b>80.6098</b>	<b>-22.0098</b>
1995	<b>56.4000</b>	<b>78.3682</b>	<b>-21.9682</b>
1996	<b>54.5000</b>	<b>77.3579</b>	<b>-22.8579</b>
1997	<b>53.8000</b>	<b>77.5839</b>	<b>-23.7839</b>
1998	<b>52.3000</b>	<b>74.2538</b>	<b>-21.9538</b>

1999	47.2000	73.4468	-26.2468
2000	41.6000	67.2422	-25.6422
Mean	60.3500	79.2310	-18.8810

Note: The average treatment effect over the posttreatment period is **-18.8810**.

Implementing leave-one-out robustness test that excludes one control unit with a nonzero weight **Utah...Nevada...Montana...Colorado**

Leave-one-out robustness test results in the posttreatment period:

Time	Outcome		Synthetic Outcome (LOO)	
	Actual	Synthetic	Min	Max
1989	82.4000	89.8817	88.3095	92.3509
1990	77.8000	87.3906	83.4275	89.2205
1991	68.7000	82.0701	80.7882	82.4889
1992	67.5000	81.4910	80.6920	81.8815
1993	63.4000	81.0765	79.7801	81.9412
1994	58.6000	80.6098	78.6141	83.1722
1995	56.4000	78.3682	76.0772	81.3044
1996	54.5000	77.3579	75.0801	80.4987
1997	53.8000	77.5839	71.7877	84.3153
1998	52.3000	74.2538	71.2588	78.9343
1999	47.2000	73.4468	71.6120	77.4336
2000	41.6000	67.2422	65.0850	69.8771

Note: The last two columns report the minimum and maximum synthetic outcomes when one control unit with a nonzero weight is excluded.

Time	Treatment Effect	Treatment Effect (LOO)	
		Min	Max
1989	-7.4817	-9.9509	-5.9095
1990	-9.5906	-11.4205	-5.6275
1991	-13.3701	-13.7889	-12.0882
1992	-13.9910	-14.3815	-13.1920
1993	-17.6765	-18.5412	-16.3801
1994	-22.0098	-24.5722	-20.0141
1995	-21.9682	-24.9044	-19.6772
1996	-22.8579	-25.9987	-20.5801
1997	-23.7839	-30.5153	-17.9877
1998	-21.9538	-26.6343	-18.9588
1999	-26.2468	-30.2336	-24.4120
2000	-25.6422	-28.2771	-23.4850

Note: The last two columns report the minimum and maximum treatment effects when one control unit with a nonzero weight is excluded.

Finished.

.  
. \*偏差校正  
. allsynth cigsale cigsale(1975) cigsale(1980) cigsale(1988) beer(1984(1)1988) lnincome retprice age15to24, trunit(3) trperiod(1989:2000)  
Identifying donor pool...

Bias-correcting the plain vanilla -synth- estimate for state 3

## Synthetic Control Method for Comparative Case Studies

### First Step: Data Setup

Data Setup successful

Treated Unit: **California**  
Control Units: **Alabama, Arkansas, Colorado, Connecticut, Delaware, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming**

Dependent Variable: **cigsale**  
MSPE minimized for periods: **1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988**  
Results obtained for periods: **1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989**

Predictors: **cigsale(1975) cigsale(1980) cigsale(1988) beer(1984(1)1988) lnincome retprice age15to24**

Unless period is specified  
predictors are averaged over: **1980 1981 1982 1983 1984 1985 1986 1987 1988**

Second Step: Run Optimization	
Nested optimization requested	
Starting nested optimization module	
Optimization done	
Optimization done	
Third Step: Obtain Results	
Loss: Root Mean Squared Prediction Error	
RMSPE	1.756494

Unit Weights:	
Co_No	Unit_Weight
Alabama	0
Arkansas	0
Colorado	.162
Connecticut	.068
Delaware	0
Georgia	0
Idaho	0
Illinois	0
Indiana	0
Iowa	0
Kansas	0
Kentucky	0
Louisiana	0
Maine	0
Minnesota	0
Mississippi	0
Missouri	0
Montana	.199
Nebraska	0
Nevada	.235
New Hampshire	0
New Mexico	0
North Carolina	0
North Dakota	0
Ohio	0
Oklahoma	0
Pennsylvania	0
Rhode Island	0
South Carolina	0
South Dakota	0
Tennessee	0
Texas	0
Utah	.335
Vermont	0
Virginia	0
West Virginia	0
Wisconsin	0
Wyoming	0

Predictor Balance:		
	Treated	Synthetic
cigsale(1975)	127.1	126.9469
cigsale(1980)	120.2	120.3415
cigsale(1988)	90.1	91.556
beer(1984(1)1988)	24.28	24.18258
lnincome	10.07656	9.849172
retprice	89.42222	89.32609
age15to24	.1735324	.1733873

Saving results...

Combining data files  
(7 observations deleted)

Treated unit (state == 3) results:



	state	year	gap	gap_bc	unique_W
1.	3	1970	6.0186	-2.2605	1
2.	3	1971	2.220801	-2.874503	1
3.	3	1972	-.6653026	-1.909985	1
4.	3	1973	-.939297	-2.152015	1
5.	3	1974	-.1454027	-1.067813	1
6.	3	1975	.153099	0	1
7.	3	1976	.267801	.8210469	1
8.	3	1977	.7986006	1.337468	1
9.	3	1978	1.2558	2.237591	1
10.	3	1979	-.8998994	-2.50262	1
11.	3	1980	-.1415034	0	1
12.	3	1981	-1.4822	-3.477387	1
13.	3	1982	-1.3527	-2.726883	1
14.	3	1983	-.410696	-1.755542	1
15.	3	1984	1.537201	-.3493944	1
16.	3	1985	-.3251962	-1.18576	1
17.	3	1986	-.0290059	-.8304938	1
18.	3	1987	-2.138098	-1.82406	1
19.	3	1988	-1.456	0	1
20.	3	1989	-7.481697	-5.237414	1
21.	3	1990	-9.590598	-3.839991	1
22.	3	1991	-13.3701	-6.959421	1
23.	3	1992	-13.991	-6.257105	1
24.	3	1993	-17.6765	-9.143993	1
25.	3	1994	-22.0098	-13.93986	1
26.	3	1995	-21.9682	-13.18923	1
27.	3	1996	-22.8579	-14.53103	1
28.	3	1997	-23.7839	-14.64134	1
29.	3	1998	-21.9538	-12.27242	1
30.	3	1999	-26.2468	-18.39958	1
31.	3	2000	-25.6422	-18.8291	1

allsynth is a user-written command made freely-available to the research community. Please cite the paper:

Wiltshire, Justin C., 2022. allsynth: (Stacked) Synthetic Control Bias-Correction Utilities for Stata. Working paper.

. allsynth cigsale cigsale(1975) cigsale(1980) cigsale(1988) beer(1984(1)1988) lnincome retprice age15to24, trunit(3) trperiod(1970-1999)  
Identifying donor pool...

Bias-correcting the plain vanilla -synth- estimate for state 3

### Synthetic Control Method for Comparative Case Studies

#### First Step: Data Setup

Data Setup successful

Treated Unit: California  
Control Units: Alabama, Arkansas, Colorado, Connecticut, Delaware, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming

Dependent Variable: cigsale  
MSPE minimized for periods: 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988  
Results obtained for periods: 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989

Predictors: cigsale(1975) cigsale(1980) cigsale(1988) beer(1984(1)1988) lnincome retprice age15to24

Unless period is specified  
predictors are averaged over: 1980 1981 1982 1983 1984 1985 1986 1987 1988

Second Step: Run Optimization	
Nested optimization requested	
Starting nested optimization module	
Optimization done	
Optimization done	
Third Step: Obtain Results	
Loss: Root Mean Squared Prediction Error	
RMSPE	1.771575

Unit Weights:	
Co_No	Unit_Weight
Alabama	0
Arkansas	0
Colorado	.178
Connecticut	.07
Delaware	0
Georgia	0
Idaho	0
Illinois	0
Indiana	0
Iowa	0
Kansas	0
Kentucky	0
Louisiana	0
Maine	0
Minnesota	0
Mississippi	0
Missouri	0
Montana	.187
Nebraska	0
Nevada	.231
New Hampshire	0
New Mexico	.003
North Carolina	0
North Dakota	0
Ohio	0
Oklahoma	0
Pennsylvania	0
Rhode Island	0
South Carolina	0
South Dakota	0
Tennessee	0
Texas	0
Utah	.331
Vermont	0
Virginia	0
West Virginia	0
Wisconsin	0
Wyoming	0

Predictor Balance:			
		Treated	Synthetic
cigsale(1975)		127.1	126.9642
cigsale(1980)		120.2	120.5076
cigsale(1988)		90.1	91.6795
beer(1984(1)1988)		24.28	24.17328
lnincome		10.07656	9.862575
retprice		89.42222	89.35969
age15to24		.1735324	.1736294

Estimating synthetic controls using in-space placebo treatments for treated unit state == 3. This could take awhile...

1 of 38 (donor pool unit state == 1 for treated unit state == 3)  
2 of 38 (donor pool unit state == 2 for treated unit state == 3)  
3 of 38 (donor pool unit state == 4 for treated unit state == 3)  
4 of 38 (donor pool unit state == 5 for treated unit state == 3)  
5 of 38 (donor pool unit state == 6 for treated unit state == 3)  
6 of 38 (donor pool unit state == 7 for treated unit state == 3)  
7 of 38 (donor pool unit state == 8 for treated unit state == 3)  
8 of 38 (donor pool unit state == 9 for treated unit state == 3)  
9 of 38 (donor pool unit state == 10 for treated unit state == 3)  
10 of 38 (donor pool unit state == 11 for treated unit state == 3)  
11 of 38 (donor pool unit state == 12 for treated unit state == 3)  
12 of 38 (donor pool unit state == 13 for treated unit state == 3)  
13 of 38 (donor pool unit state == 14 for treated unit state == 3)  
14 of 38 (donor pool unit state == 15 for treated unit state == 3)  
15 of 38 (donor pool unit state == 16 for treated unit state == 3)  
16 of 38 (donor pool unit state == 17 for treated unit state == 3)  
17 of 38 (donor pool unit state == 18 for treated unit state == 3)  
18 of 38 (donor pool unit state == 19 for treated unit state == 3)  
19 of 38 (donor pool unit state == 20 for treated unit state == 3)  
20 of 38 (donor pool unit state == 21 for treated unit state == 3)  
21 of 38 (donor pool unit state == 22 for treated unit state == 3)  
22 of 38 (donor pool unit state == 23 for treated unit state == 3)  
23 of 38 (donor pool unit state == 24 for treated unit state == 3)  
24 of 38 (donor pool unit state == 25 for treated unit state == 3)  
25 of 38 (donor pool unit state == 26 for treated unit state == 3)  
26 of 38 (donor pool unit state == 27 for treated unit state == 3)  
27 of 38 (donor pool unit state == 28 for treated unit state == 3)  
28 of 38 (donor pool unit state == 29 for treated unit state == 3)  
29 of 38 (donor pool unit state == 30 for treated unit state == 3)  
30 of 38 (donor pool unit state == 31 for treated unit state == 3)  
31 of 38 (donor pool unit state == 32 for treated unit state == 3)  
32 of 38 (donor pool unit state == 33 for treated unit state == 3)  
33 of 38 (donor pool unit state == 34 for treated unit state == 3)  
34 of 38 (donor pool unit state == 35 for treated unit state == 3)  
35 of 38 (donor pool unit state == 36 for treated unit state == 3)  
36 of 38 (donor pool unit state == 37 for treated unit state == 3)  
37 of 38 (donor pool unit state == 38 for treated unit state == 3)  
38 of 38 (donor pool unit state == 39 for treated unit state == 3)

Saving results...  
(741 missing values generated)  
(741 missing values generated)

Combining data files  
(1,178 observations deleted)

Treated unit (state == 3) results:

	state	year	gap	gap_bc	rmspe	r~e_rank	rmspe_bc	r~c_rank	p	p_bc	N	unique_W
1179.	3	1970	5.8662	-2.320717	.	.	.	.	.	.	39	1
1180.	3	1971	2.119802	-2.923697	.	.	.	.	.	.	39	1
1181.	3	1972	-.7876026	-2.067084	.	.	.	.	.	.	39	1
1182.	3	1973	-1.125397	-2.342834	.	.	.	.	.	.	39	1
1183.	3	1974	-.2119028	-1.127654	.	.	.	.	.	.	39	1
1184.	3	1975	.135799	0	.	.	.	.	.	.	39	1
1185.	3	1976	.202601	.7979923	.	.	.	.	.	.	39	1
1186.	3	1977	.7440006	1.352029	.	.	.	.	.	.	39	1
1187.	3	1978	1.2371	2.322538	.	.	.	.	.	.	39	1
1188.	3	1979	-1.048499	-2.480246	.	.	.	.	.	.	39	1
1189.	3	1980	-.3076034	0	.	.	.	.	.	.	39	1
1190.	3	1981	-1.7136	-3.490409	.	.	.	.	.	.	39	1
1191.	3	1982	-1.538999	-2.681203	.	.	.	.	.	.	39	1
1192.	3	1983	-.6553961	-1.779878	.	.	.	.	.	.	39	1
1193.	3	1984	1.263101	-.3931724	.	.	.	.	.	.	39	1
1194.	3	1985	-.5135962	-1.176612	.	.	.	.	.	.	39	1
1195.	3	1986	-.2674058	-.8697026	.	.	.	.	.	.	39	1
1196.	3	1987	-2.279398	-1.823644	.	.	.	.	.	.	39	1
1197.	3	1988	-1.5795	0	.	.	.	.	.	.	39	1
1198.	3	1989	-7.512897	-5.159029	18.01472	1	7.532138	2	.025641	.0512821	39	1
1199.	3	1990	-9.605198	-3.814142	23.73033	1	5.824546	4	.025641	.1025641	39	1
1200.	3	1991	-13.5256	-7.042269	35.28299	1	8.561312	4	.025641	.1025641	39	1
1201.	3	1992	-14.0858	-6.298427	42.29351	1	9.227623	5	.025641	.1282051	39	1
1202.	3	1993	-17.7701	-9.202892	53.99165	1	12.17569	1	.025641	.025641	39	1
1203.	3	1994	-22.0908	-13.95112	70.95182	1	19.32654	1	.025641	.025641	39	1
1204.	3	1995	-21.9966	-13.15829	82.87688	1	23.56537	1	.025641	.025641	39	1
1205.	3	1996	-22.877	-14.48943	93.3968	1	28.04638	1	.025641	.025641	39	1
1206.	3	1997	-23.7447	-14.5317	103.0136	1	31.57018	1	.025641	.025641	39	1

1207.	3	1998	-21.9438	-12.22969	108.0809	1	32.64582	2	.025641	.0512821	39	1
1208.	3	1999	-26.2639	-18.36851	118.2696	1	38.35838	2	.025641	.0512821	39	1
1209.	3	2000	-25.6728	-18.78283	125.9436	1	43.48184	2	.025641	.0512821	39	1

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Wiltshire, Justin C., 2022. allsynth: (Stacked) Synthetic Control Bias-Correction Utilities for Stata. Working paper.

```
.
. *多名干预对象
. gen treat=1 if state==3 | state==7
(1,147 missing values generated)

.replace treat=0 if treat==.
(1,147 real changes made)

.
. gen treatyear=1989 if state==3 | state==7
(1,147 missing values generated)

.
. *计算平均干预效应
. allsynth cigsale cigsale(1975) cigsale(1980) cigsale(1988) beer(1984(1)1988) lnincome retprice age15to24, xperiod(1980(1)1988)
> ))
```

Identifying donor pool...

Bias-correcting the plain vanilla -synth- estimate for state 3

### Synthetic Control Method for Comparative Case Studies

#### First Step: Data Setup

Data Setup successful

Treated Unit: **California**  
Control Units: **Alabama, Arkansas, Colorado, Connecticut, Delaware, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee,**

Dependent Variable: **cigsale**  
MSPE minimized for periods: **1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988**  
Results obtained for periods: **1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989**

Predictors: **cigsale(1975) cigsale(1980) cigsale(1988) beer(1984(1)1988) lnincome retprice age15to24**

Unless period is specified  
predictors are averaged over: **1980 1981 1982 1983 1984 1985 1986 1987 1988**

#### Second Step: Run Optimization

Nested optimization requested  
Starting nested optimization module  
Optimization done

Optimization done

#### Third Step: Obtain Results

Loss: Root Mean Squared Prediction Error

RMSPE	<b>1.754249</b>
-------	-----------------

Unit Weights:

Co_No	Unit_Weight
Alabama	0
Arkansas	0
Colorado	.16
Connecticut	.068
Delaware	0
Idaho	0
Illinois	0
Indiana	0
Iowa	0
Kansas	0
Kentucky	0
Louisiana	0
Maine	0
Minnesota	0
Mississippi	0
Missouri	0
Montana	.202
Nebraska	0
Nevada	.236
New Hampshire	0
New Mexico	0
North Carolina	0
North Dakota	0
Ohio	0
Oklahoma	0
Pennsylvania	0
Rhode Island	0
South Carolina	0
South Dakota	0
Tennessee	0
Texas	0
Utah	.335
Vermont	0
Virginia	0
West Virginia	0
Wisconsin	0
Wyoming	0

Predictor Balance:

	Treated	Synthetic
cigsale(1975)	127.1	127.2612
cigsale(1980)	120.2	120.6232
cigsale(1988)	90.1	91.77
beer(1984(1)1988)	24.28	24.25306
lnincome	10.07656	9.868487
retprice	89.42222	89.51086
age15to24	.1735324	.173699

Saving results...

Combining data files  
(6 observations deleted)

Treated unit (state == 3) results:

	state	year	gap	gap_bc	unique_W
1.	3	1970	5.7451	-2.171597	1
2.	3	1971	1.934501	-2.761184	1
3.	3	1972	-.9619026	-1.786898	1
4.	3	1973	-1.224697	-2.064048	1
5.	3	1974	-.4502027	-1.006077	1
6.	3	1975	-.161201	0	1
7.	3	1976	-.039899	.8127766	1
8.	3	1977	.4908006	1.304793	1
9.	3	1978	.9456001	2.21134	1
10.	3	1979	-1.181099	-2.500461	1
11.	3	1980	-.4232033	0	1
12.	3	1981	-1.7498	-3.508218	1
13.	3	1982	-1.623999	-2.779855	1
14.	3	1983	-.660396	-1.772241	1
15.	3	1984	1.309701	-.3564408	1

16.	3	1985	-.5578961	-1.160074	1
17.	3	1986	-.2452059	-.7952191	1
18.	3	1987	-2.356098	-1.738294	1
19.	3	1988	-1.67	0	1
20.	3	1989	-7.700597	-5.290646	1
21.	3	1990	-9.807198	-3.874971	1
22.	3	1991	-13.5539	-7.040526	1
23.	3	1992	-14.1842	-6.344555	1
24.	3	1993	-17.8654	-9.189892	1
25.	3	1994	-22.2014	-13.9884	1
26.	3	1995	-22.1698	-13.39375	1
27.	3	1996	-23.0526	-14.65891	1
28.	3	1997	-23.9836	-14.83706	1
29.	3	1998	-22.1611	-12.4482	1
30.	3	1999	-26.4393	-18.55172	1
31.	3	2000	-25.8159	-19.07238	1

Identifying donor pool...

Bias-correcting the plain vanilla -synth- estimate for state 7

## Synthetic Control Method for Comparative Case Studies

### First Step: Data Setup

Data Setup successful

Treated Unit: **Georgia**  
Control Units: **Alabama, Arkansas, Colorado, Connecticut, Delaware, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming**

Dependent Variable: **cigsale**  
MSPE minimized for periods: **1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988**  
Results obtained for periods: **1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989**

Predictors: **cigsale(1975) cigsale(1980) cigsale(1988) beer(1984(1)1988) lnincome retprice age15to24**

Unless period is specified  
predictors are averaged over: **1980 1981 1982 1983 1984 1985 1986 1987 1988**

### Second Step: Run Optimization

Nested optimization requested  
Starting nested optimization module  
Optimization done

Optimization done

### Third Step: Obtain Results

Loss: Root Mean Squared Prediction Error

RMSPE	<b>1.2189</b>
-------	---------------

Unit Weights:

Co_No	Unit_Weight
Alabama	<b>0</b>
Arkansas	<b>0</b>
Colorado	<b>0</b>
Connecticut	<b>.083</b>
Delaware	<b>.077</b>
Idaho	<b>0</b>
Illinois	<b>0</b>
Indiana	<b>0</b>
Iowa	<b>0</b>
Kansas	<b>0</b>
Kentucky	<b>0</b>
Louisiana	<b>0</b>

Maine	0
Minnesota	0
Mississippi	0
Missouri	0
Montana	0
Nebraska	0
Nevada	0
New Hampshire	0
New Mexico	0
North Carolina	0
North Dakota	0
Ohio	.129
Oklahoma	0
Pennsylvania	0
Rhode Island	0
South Carolina	.176
South Dakota	0
Tennessee	.509
Texas	0
Utah	0
Vermont	0
Virginia	.026
West Virginia	0
Wisconsin	0
Wyoming	0

Predictor Balance:

	Treated	Synthetic
cigsale(1975)	122.9	123.0091
cigsale(1980)	134	133.1898
cigsale(1988)	124.1	124.0838
beer(1984(1)1988)	21.76	21.92846
lnincome	9.817172	9.806681
retprice	84.36667	85.21416
age15to24	.1769441	.173339

Saving results...

Combining data files  
(6 observations deleted)

Treated unit (state == 7) results:

	state	year	gap	gap_bc	unique_W
1.	7	1970	.0550004	1.177898	1
2.	7	1971	-.2240046	.609875	1
3.	7	1972	-1.4858	-.2247388	1
4.	7	1973	1.625804	1.963361	1
5.	7	1974	1.819796	2.265991	1
6.	7	1975	-.1090994	0	1
7.	7	1976	-1.499297	-1.861507	1
8.	7	1977	-1.730498	-1.914631	1
9.	7	1978	-1.623195	-1.931541	1
10.	7	1979	.2295029	-.6798201	1
11.	7	1980	.8102027	0	1
12.	7	1981	-.4055081	-1.752914	1
13.	7	1982	-2.1228	-3.626619	1
14.	7	1983	-1.656295	-2.394499	1
15.	7	1984	-.1060961	-.9518459	1
16.	7	1985	1.037905	.448728	1
17.	7	1986	1.2636	.5947435	1
18.	7	1987	1.1076	1.032056	1
19.	7	1988	.0161957	0	1
20.	7	1989	-4.8898	-4.891725	1
21.	7	1990	-4.449598	-3.323005	1
22.	7	1991	-6.9525	-6.633399	1
23.	7	1992	-5.712204	-5.045339	1
24.	7	1993	-5.448804	-4.937579	1
25.	7	1994	-5.254498	-4.723249	1
26.	7	1995	-16.3076	-15.93086	1
27.	7	1996	-8.870302	-8.663605	1

28.	7	1997	-14.5049	-14.62926	1
29.	7	1998	-15.725	-15.22655	1
30.	7	1999	-13.8991	-13.34806	1
31.	7	2000	-17.3761	-17.44494	1

Stacking the estimates...

Calculating the estimated average treatment effect for treated units

	_tm	gap	gap_bc
1.	1970	2.90005	-.4968491
2.	1971	.8552484	-1.075654
3.	1972	-1.223851	-1.005819
4.	1973	.2005537	-.0503433
5.	1974	.6847965	.6299567
6.	1975	-.1351502	0
7.	1976	-.7695982	-.5243652
8.	1977	-.6198487	-.3049191
9.	1978	-.3387972	.1398995
10.	1979	-.4757982	-1.59014
11.	1980	.1934997	0
12.	1981	-1.077654	-2.630566
13.	1982	-1.8734	-3.203237
14.	1983	-1.158346	-2.08337
15.	1984	.6018027	-.6541433
16.	1985	.2400042	-.3556732
17.	1986	.5091972	-.1002378
18.	1987	-.6242487	-.353119
19.	1988	-.826902	0
20.	1989	-6.295198	-5.091186
21.	1990	-7.128398	-3.598988
22.	1991	-10.2532	-6.836963
23.	1992	-9.948202	-5.694947
24.	1993	-11.6571	-7.063735
25.	1994	-13.72795	-9.355825
26.	1995	-19.2387	-14.6623
27.	1996	-15.96145	-11.66126
28.	1997	-19.24425	-14.73316
29.	1998	-18.94305	-13.83738
30.	1999	-20.1692	-15.94989
31.	2000	-21.596	-18.25866
32.	.	.	.

Estimated average treatment effects saved in smokingresults\_ate.dta

allsynth is a user-written command made freely-available to the research community. Please cite the paper:

Wiltshire, Justin C., 2022. allsynth: (Stacked) Synthetic Control Bias-Correction Utilities for Stata. Working paper.

```
.  
. *执行安慰剂检验  
. allsynth cigsale cigsale(1975) cigsale(1980) cigsale(1988) beer(1984(1)1988) lnincome retprice age15to24, xperiod(1980(1)1988)  
> bcorrect placebos))
```

Erasing existing smokingresults\_state3.dta file...

Erasing existing smokingresults\_state7.dta file...

Identifying donor pool...

Bias-correcting the plain vanilla -synth- estimate for state 3



Data Setup successful																			
Treated Unit: California																			
Control Units: Alabama, Arkansas, Colorado, Connecticut, Delaware, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee,																			
Dependent Variable: cigsale																			
MSPE minimized for periods: 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988																			
Results obtained for periods: 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989																			
Predictors: cigsale(1975) cigsale(1980) cigsale(1988) beer(1984(1)1988) lnincome retprice age15to24																			
Unless period is specified																			
predictors are averaged over: 1980 1981 1982 1983 1984 1985 1986 1987 1988																			

```
Nested optimization requested
Starting nested optimization module
Optimization done
```

### Third Step: Obtain Results

**Loss: Root Mean Squared Prediction Error**

RMSPE	<b>1.783572</b>
-------	-----------------

## Unit Weights:

Co_No	Unit_Weight
Alabama	0
Arkansas	0
Colorado	.179
Connecticut	.072
Delaware	0
Idaho	.001
Illinois	0
Indiana	0
Iowa	0
Kansas	0
Kentucky	0
Louisiana	0
Maine	0
Minnesota	0
Mississippi	0
Missouri	0
Montana	.192
Nebraska	0
Nevada	.227
New Hampshire	0
New Mexico	0
North Carolina	0
North Dakota	0
Ohio	0
Oklahoma	0
Pennsylvania	0
Rhode Island	0
South Carolina	0
South Dakota	0
Tennessee	0
Texas	0
Utah	.329
Vermont	0
Virginia	0
West Virginia	0
Wisconsin	0
Wyoming	0

### Predictor Balance:

	Treated	Synthetic
cigsale(1975)	127.1	126.7757
cigsale(1980)	120.2	120.4313
cigsale(1988)	90.1	91.593
beer(1984(1)1988)	24.28	24.14276
lnincome	10.07656	9.862832
retprice	89.42222	89.34898
age15to24	.1735324	.173559

Estimating synthetic controls using in-space placebo treatments for treated unit state == 3. This could take awhile...

1 of 37 (donor pool unit state == 1 for treated unit state == 3)  
2 of 37 (donor pool unit state == 2 for treated unit state == 3)  
3 of 37 (donor pool unit state == 4 for treated unit state == 3)  
4 of 37 (donor pool unit state == 5 for treated unit state == 3)  
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35 of 37 (donor pool unit state == 37 for treated unit state == 3)  
36 of 37 (donor pool unit state == 38 for treated unit state == 3)  
37 of 37 (donor pool unit state == 39 for treated unit state == 3)

Saving results...  
(722 missing values generated)  
(722 missing values generated)

Combining data files  
(1,147 observations deleted)

Treated unit (state == 3) results:

	state	year	gap	gap_bc	rmspe	r~e_rank	rmspe_bc	r~c_rank	p	p_bc	N	unique_W
1148.	3	1970	6.002	-2.271363	.	.	.	.	.	.	38	1
1149.	3	1971	2.247801	-2.876126	.	.	.	.	.	.	38	1
1150.	3	1972	-.6457025	-2.038375	.	.	.	.	.	.	38	1
1151.	3	1973	-.9550969	-2.328511	.	.	.	.	.	.	38	1
1152.	3	1974	-.0337028	-1.09714	.	.	.	.	.	.	38	1
1153.	3	1975	.324299	0	.	.	.	.	.	.	38	1
1154.	3	1976	.360601	.7621291	.	.	.	.	.	.	38	1
1155.	3	1977	.8438006	1.274908	.	.	.	.	.	.	38	1
1156.	3	1978	1.3306	2.293347	.	.	.	.	.	.	38	1
1157.	3	1979	-.9393994	-2.462758	.	.	.	.	.	.	38	1
1158.	3	1980	-.2313034	0	.	.	.	.	.	.	38	1
1159.	3	1981	-1.648	-3.523445	.	.	.	.	.	.	38	1
1160.	3	1982	-1.522299	-2.756085	.	.	.	.	.	.	38	1
1161.	3	1983	-.6249961	-1.799408	.	.	.	.	.	.	38	1
1162.	3	1984	1.210001	-.484748	.	.	.	.	.	.	38	1
1163.	3	1985	-.4828962	-1.165836	.	.	.	.	.	.	38	1

1164.	3	1986	-.2162058	-.8437151	.	.	.	.	.	38	1	
1165.	3	1987	-2.180198	-1.726579	.	.	.	.	.	38	1	
1166.	3	1988	-1.493	0	.	.	.	.	.	38	1	
1167.	3	1989	-7.423497	-5.187696	17.38986	1	7.714916	1	.0263158	.0263158	38	1
1168.	3	1990	-9.520798	-3.809821	22.99689	1	5.937928	2	.0263158	.0526316	38	1
1169.	3	1991	-13.5104	-7.143966	34.53096	1	8.835471	3	.0263158	.0789474	38	1
1170.	3	1992	-14.095	-6.411434	41.57111	1	9.572601	4	.0263158	.1052632	38	1
1171.	3	1993	-17.7818	-9.293329	53.21228	2	12.60979	4	.0526316	.1052632	38	1
1172.	3	1994	-22.1301	-14.02913	70.10052	1	19.91171	2	.0263158	.0526316	38	1
1173.	3	1995	-22.0627	-13.40466	82.02927	1	24.42579	1	.0263158	.0263158	38	1
1174.	3	1996	-22.9211	-14.65077	92.49896	2	29.0641	1	.0526316	.0263158	38	1
1175.	3	1997	-23.8155	-14.7729	102.1077	1	32.78614	1	.0263158	.0263158	38	1
1176.	3	1998	-22.0184	-12.47156	107.1955	1	33.96638	1	.0263158	.0263158	38	1
1177.	3	1999	-26.2959	-18.55296	117.2868	1	39.84901	1	.0263158	.0263158	38	1
1178.	3	2000	-25.7174	-19.05677	124.905	1	45.20387	1	.0263158	.0263158	38	1

Identifying donor pool...

Bias-correcting the plain vanilla -synth- estimate for state 7

Synthetic Control Method for Comparative Case Studies																					
First Step: Data Setup																					
Data Setup successful																					
<div> <div>Treated Unit: Georgia</div> <div>Control Units: Alabama, Arkansas, Colorado, Connecticut, Delaware, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming</div> </div>																					
<div> <div>Dependent Variable: cigsale</div> <div>MSPE minimized for periods: 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988</div> <div>Results obtained for periods: 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989</div> </div>																					
<div> <div>Predictors: cigsale(1975) cigsale(1980) cigsale(1988) beer(1984(1)1988) lnincome retprice age15to24</div> </div>																					
<div> <div>Unless period is specified</div> <div>predictors are averaged over: 1980 1981 1982 1983 1984 1985 1986 1987 1988</div> </div>																					
Second Step: Run Optimization																					
<div> <div>Nested optimization requested</div> <div>Starting nested optimization module</div> <div>Optimization done</div> </div>																					
Optimization done																					
Third Step: Obtain Results																					
Loss: Root Mean Squared Prediction Error																					
<div> <div>RMSPE</div> <div>1.32851</div> </div>																					

Unit Weights:

Co_No	Unit_Weight
Alabama	0
Arkansas	.014
Colorado	0
Connecticut	.052
Delaware	.017
Idaho	0
Illinois	0
Indiana	0
Iowa	0
Kansas	0
Kentucky	.017
Louisiana	.003
Maine	0
Minnesota	0

Mississippi	0
Missouri	0
Montana	0
Nebraska	0
Nevada	0
New Hampshire	0
New Mexico	0
North Carolina	0
North Dakota	0
Ohio	.299
Oklahoma	.001
Pennsylvania	0
Rhode Island	0
South Carolina	.161
South Dakota	0
Tennessee	.431
Texas	.001
Utah	0
Vermont	.001
Virginia	0
West Virginia	0
Wisconsin	0
Wyoming	0

Predictor Balance:

	Treated	Synthetic
cigsale(1975)	122.9	122.6804
cigsale(1980)	134	133.4493
cigsale(1988)	124.1	123.7175
beer(1984(1)1988)	21.76	21.9853
lnincome	9.817172	9.768146
retprice	84.36667	84.25469
age15to24	.1769441	.1720836

Estimating synthetic controls using in-space placebo treatments for treated unit state == 7. This could take awhile...

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1 of 37 (donor pool unit state == 1 for treated unit state == 7)
2 of 37 (donor pool unit state == 2 for treated unit state == 7)
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36 of 37 (donor pool unit state == 38 for treated unit state == 7)
37 of 37 (donor pool unit state == 39 for treated unit state == 7)

```

```

Saving results...
(722 missing values generated)
(722 missing values generated)

```

Treated unit (state == 7) results:

	state	year	gap	gap_bc	rmspe	r~e_rank	rmspe_bc	r~c_rank	p	p_bc	N	unique_W
1148.	7	1970	.2353008	.5263755	.	.	.	.	.	.	38	0
1149.	7	1971	.3153961	.4073054	.	.	.	.	.	.	38	0
1150.	7	1972	-1.0301	-.0910132	.	.	.	.	.	.	38	0
1151.	7	1973	2.265104	2.072585	.	.	.	.	.	.	38	0
1152.	7	1974	2.481397	2.452803	.	.	.	.	.	.	38	0
1153.	7	1975	.2196009	0	.	.	.	.	.	.	38	0
1154.	7	1976	-.7732972	-1.332986	.	.	.	.	.	.	38	0
1155.	7	1977	-1.130398	-1.393621	.	.	.	.	.	.	38	0
1156.	7	1978	-1.345695	-1.484658	.	.	.	.	.	.	38	0
1157.	7	1979	.2583037	-.5302888	.	.	.	.	.	.	38	0
1158.	7	1980	.550702	0	.	.	.	.	.	.	38	0
1159.	7	1981	-.4436077	-1.577765	.	.	.	.	.	.	38	0
1160.	7	1982	-2.2155	-3.39702	.	.	.	.	.	.	38	0
1161.	7	1983	-1.484495	-1.789591	.	.	.	.	.	.	38	0
1162.	7	1984	.0199043	-.6648526	.	.	.	.	.	.	38	0
1163.	7	1985	1.407505	.8136141	.	.	.	.	.	.	38	0
1164.	7	1986	1.642899	.9604984	.	.	.	.	.	.	38	0
1165.	7	1987	1.989101	1.599099	.	.	.	.	.	.	38	0
1166.	7	1988	.3824962	0	.	.	.	.	.	.	38	0
1167.	7	1989	-4.4807	-4.700035	.	37	.	37	.9736842	.9736842	38	0
1168.	7	1990	-4.533998	-3.095605	.	12	.	12	.3157895	.3157895	38	0
1169.	7	1991	-7.4566	-6.636958	.	20	.	20	.5263158	.5263158	38	0
1170.	7	1992	-6.300205	-4.966776	.	10	.	10	.2631579	.2631579	38	0
1171.	7	1993	-5.236604	-4.060648	.	30	.	30	.7894737	.7894737	38	0
1172.	7	1994	-5.099998	-3.542223	.	20	.	20	.5263158	.5263158	38	0
1173.	7	1995	-16.2	-14.98243	.	31	.	31	.8157895	.8157895	38	0
1174.	7	1996	-8.748701	-7.907448	.	10	.	10	.2631579	.2631579	38	0
1175.	7	1997	-14.5137	-13.81467	.	21	.	21	.5526316	.5526316	38	0
1176.	7	1998	-14.5559	-13.18258	.	18	.	18	.4736842	.4736842	38	0
1177.	7	1999	-12.4747	-11.25846	.	1	.	1	.0263158	.0263158	38	0
1178.	7	2000	-15.7794	-15.51651	.	38	.	38	1	1	38	0

Warning: the -synth- weighting matrix W for treated unit (state == 7) contains more non-zero weights than predictor variables and

Stacking the estimates...

Calculating the estimated average treatment effect for treated units

	_tm	gap	gap_bc
1.	1970	3.11865	-.8724936
2.	1971	1.281599	-1.234411
3.	1972	-.8379014	-1.064694
4.	1973	.6550037	-.1279631
5.	1974	1.223847	.6778314
6.	1975	.2719499	0
7.	1976	-.2063481	-.2854283
8.	1977	-.1432988	-.0593565
9.	1978	-.0075475	.4043443
10.	1979	-.3405478	-1.496524
11.	1980	.1596993	0
12.	1981	-1.045804	-2.550605
13.	1982	-1.8689	-3.076553
14.	1983	-1.054746	-1.7945
15.	1984	.6149529	-.5748003
16.	1985	.4623045	-.176111
17.	1986	.7133468	.0583917
18.	1987	-.0955484	-.0637404
19.	1988	-.5552518	0
20.	1989	-5.952098	-4.943865

21.	1990	-7.027398	-3.452713
22.	1991	-10.4835	-6.890462
23.	1992	-10.1976	-5.689105
24.	1993	-11.5092	-6.676989
25.	1994	-13.61505	-8.785675
26.	1995	-19.13135	-14.19354
27.	1996	-15.8349	-11.27911
28.	1997	-19.1646	-14.29379
29.	1998	-18.28715	-12.82707
30.	1999	-19.3853	-14.90571
31.	2000	-20.7484	-17.28664

Estimated average treatment effects saved in smokingresults\_ate.dta

Randomly sampling 100 placebo average treatment effects. This could take a while...

(1,919 missing values generated)  
(1,919 missing values generated)

	_place~D	_tm	gap	gap_bc	rmspe	r~e_rank	rmspe_bc	r~c_rank	p	p_bc	N
1.	0	1970	3.11865	-.8724936	.	.	.	.	.	.	101
2.	0	1971	1.281599	-1.234411	.	.	.	.	.	.	101
3.	0	1972	-.8379014	-1.064694	.	.	.	.	.	.	101
4.	0	1973	.6550037	-.1279631	.	.	.	.	.	.	101
5.	0	1974	1.223847	.6778314	.	.	.	.	.	.	101
6.	0	1975	.2719499	0	.	.	.	.	.	.	101
7.	0	1976	-.2063481	-.2854283	.	.	.	.	.	.	101
8.	0	1977	-.1432988	-.0593565	.	.	.	.	.	.	101
9.	0	1978	-.0075475	.4043443	.	.	.	.	.	.	101
10.	0	1979	-.3405478	-1.496524	.	.	.	.	.	.	101
11.	0	1980	.1596993	0	.	.	.	.	.	.	101
12.	0	1981	-1.045804	-2.550605	.	.	.	.	.	.	101
13.	0	1982	-1.8689	-3.076553	.	.	.	.	.	.	101
14.	0	1983	-1.054746	-1.7945	.	.	.	.	.	.	101
15.	0	1984	.6149529	-.5748003	.	.	.	.	.	.	101
16.	0	1985	.4623045	-.176111	.	.	.	.	.	.	101
17.	0	1986	.7133468	.0583917	.	.	.	.	.	.	101
18.	0	1987	-.0955484	-.0637404	.	.	.	.	.	.	101
19.	0	1988	-.5552518	0	.	.	.	.	.	.	101
20.	0	1989	-5.952098	-4.943865	31.46436	1	17.901	1	.009901	.009901	101
21.	0	1990	-7.027398	-3.452713	37.66213	1	13.31601	2	.009901	.019802	101
22.	0	1991	-10.4835	-6.890462	57.64453	1	20.46831	3	.009901	.029703	101
23.	0	1992	-10.1976	-5.689105	66.32291	1	21.27737	4	.009901	.039604	101
24.	0	1993	-11.5092	-6.676989	76.58709	1	23.55223	4	.009901	.039604	101
25.	0	1994	-13.61505	-8.785675	91.26142	1	29.04886	1	.009901	.009901	101
26.	0	1995	-19.13135	-14.19354	124.6619	1	45.97694	1	.009901	.009901	101
27.	0	1996	-15.8349	-11.27911	136.916	1	51.87654	1	.009901	.009901	101
28.	0	1997	-19.1646	-14.29379	157.947	1	62.73881	1	.009901	.009901	101
29.	0	1998	-18.28715	-12.82707	171.8533	1	68.51525	1	.009901	.009901	101
30.	0	1999	-19.3853	-14.90571	186.5714	1	77.07961	1	.009901	.009901	101
31.	0	2000	-20.7484	-17.28664	202.8853	1	88.8946	1	.009901	.009901	101

Sample distribution saved in smokingresults\_ate\_distn.dta

allsynth is a user-written command made freely-available to the research community. Please cite the paper:

Wiltshire, Justin C., 2022. allsynth: (Stacked) Synthetic Control Bias-Correction Utilities for Stata. Working paper.

end of do-file

```
. log close
  name: <unnamed>
  log: C:\Users\XuQi\Desktop\第12章.smcl
  log type: smcl
closed on: 21 Jul 2023, 13:57:15
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