

# COVID-19 Losses to State Tax Revenues

Sept 2020

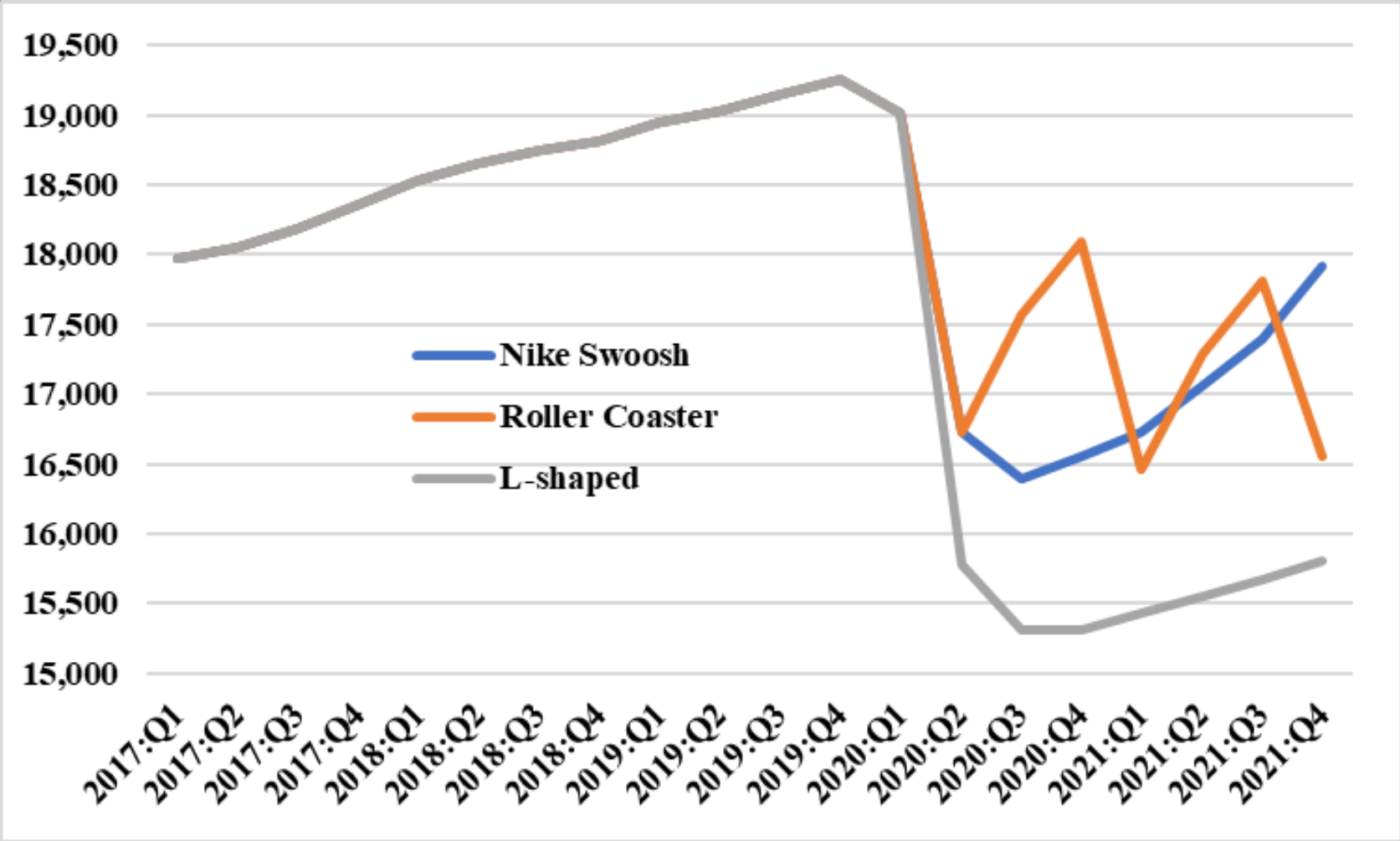
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# Three Economic Scenarios for US GDP 2017-2021 (\$2020)



**Table 1, Historical Comparison of Scenarios**

<b>Year</b>	<b>Annual Change in GDP</b>	<b>Description</b>
<b>1932</b>	<b>-12.9</b>	<b>Great Depression</b>
<b>1946</b>	<b>-11.6</b>	<b>Post WW2 transition</b>
<b>1930</b>	<b>-8.5</b>	<b>Great Depression</b>
<b>2020</b>	<b>-7.2</b>	<b>L-shaped</b>
<b>1931</b>	<b>-6.4</b>	<b>Great Depression</b>
<b>2020</b>	<b>-5.7</b>	<b>Nike Swoosh</b>
<b>2020</b>	<b>-5.6</b>	<b>CBO Current Projections</b>
<b>2020</b>	<b>-4.2</b>	<b>Roller Coaster</b>
<b>1938</b>	<b>-3.3</b>	<b>Great Depression</b>
<b>2009</b>	<b>-2.5</b>	<b>Great Recession</b>
<b>2021</b>	<b>-2.0</b>	<b>Roller Coaster (year 2)</b>
<b>1982</b>	<b>-1.8</b>	<b>Early 1980's Recession</b>
<b>1933</b>	<b>-1.2</b>	<b>Great Depression</b>
<b>1947</b>	<b>-1.1</b>	<b>Post WW2 transition</b>
<b>1945</b>	<b>-1.0</b>	<b>Post WW2 transition</b>

# How We model Tax Revenue Elasticity

$$\log(PI_{i,t}) = \theta + \delta \log(GDP_{i,t}) + \varepsilon_{i,t}$$

$$\log(Tax_{i,t}) = \theta + \delta \log(Base_{i,t}) + \rho D_{i,t} * \Delta \log(Base_{i,t}) + \dots$$
$$\dots + \alpha_i \varepsilon_{i,t-1} + \pi D * \varepsilon_{i,t-1} + \varepsilon_{i,t}$$

$\delta$  is elasticity

$\rho$  is asymmetry adjustment to disequilibrium

$\alpha_i + \pi$  is disequilibrium adjustment for t-1

# Data and Estimates

- Sales, PIT, CIT, Gaming
- Assume “other” taxes respond as average of these four
- Use NASBO tax data, 1997-2019
- Tax bases is state personal income or GDP

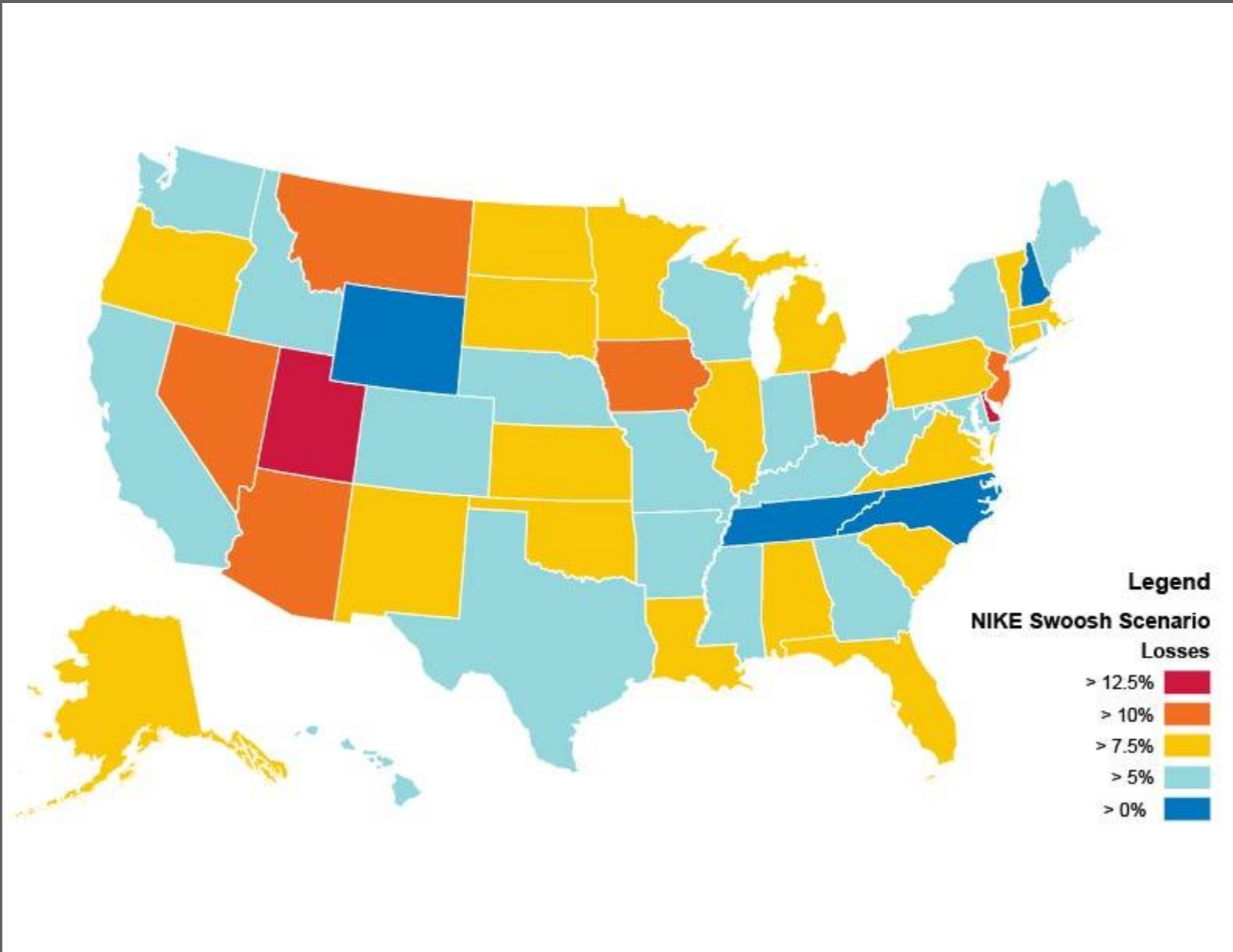
# Econometric Considerations

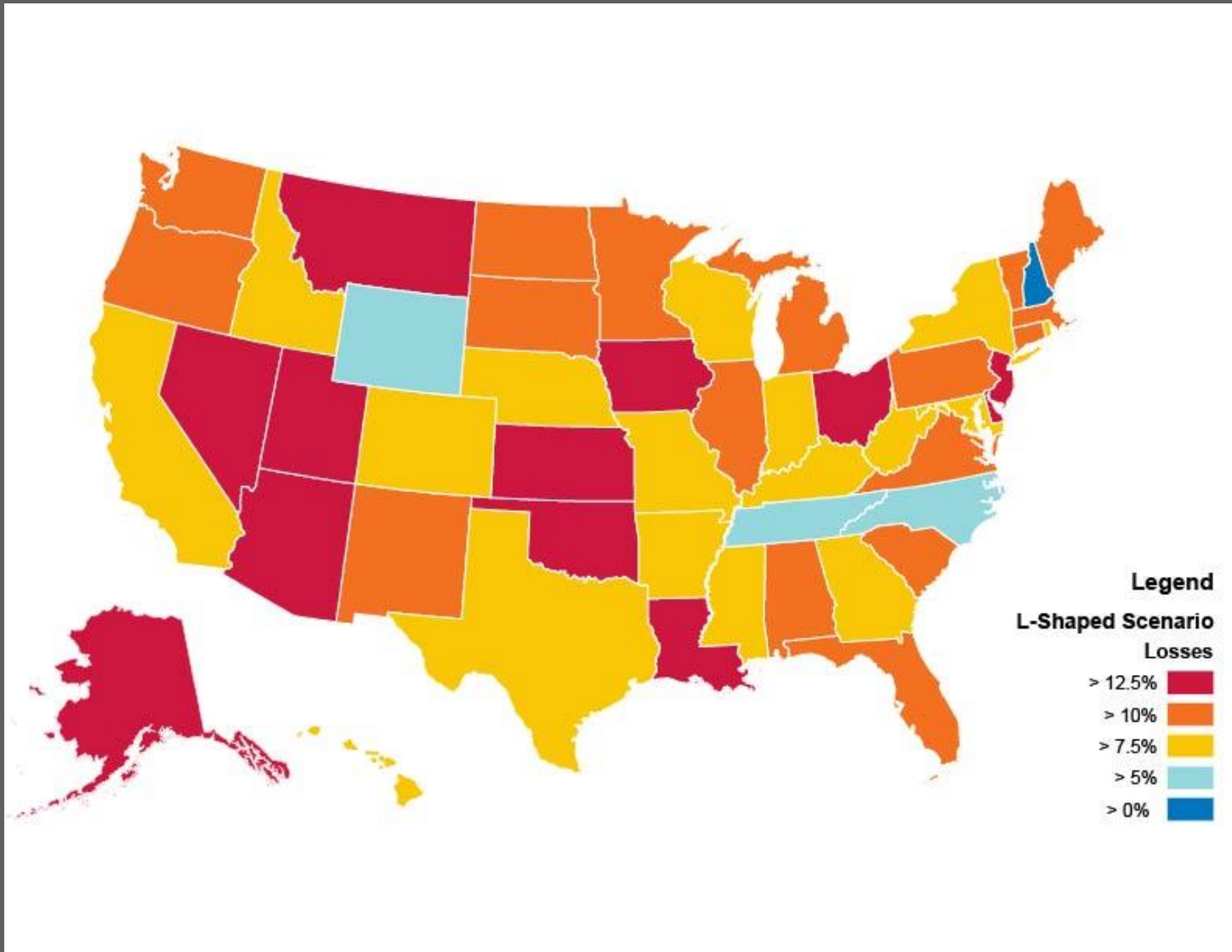
- Between 21 and 36 percent of state taxes are non-stationary
- Between 4 and 41 percent cointegrated
- No common root in panel
- So, estimated in levels, not first differences
- Don't know current equilibrium of tax revenues to base (1<sup>st</sup> Quarter 2020).

State	PIT Elasticity	CIT Elasticity	Sales Elasticity	Gaming Elasticity	PI to GDP Elasticity
Alabama	0.90	1.41	1.47	1.19	2.13
Alaska		1.88		1.82	2.08
Arizona	1.17	1.73	2.26	2.28	1.87
Arkansas	0.94	1.05	0.97	3.02	1.50
California	0.96	1.05	0.97	1.03	1.45
Colorado	0.98	0.99	0.92		1.62
Connecticut	1.01	1.04	2.07	2.01	1.57
Delaware	1.44	1.03			1.78
Florida		1.02	1.72	1.02	1.04
Georgia	1.58	-2.47	1.52		1.03
Hawaii	0.99	0.56	1.04		2.12
Idaho	1.00	1.13	0.95		1.67
Illinois	1.50	2.51	1.59	2.41	1.05
Indiana	0.92	2.04	1.91	1.71	0.34
Iowa	1.62	1.96	0.95	1.30	1.63
Kansas	1.37	1.47	0.96		1.95
Kentucky	0.86	1.19	0.95	2.39	1.40
Louisiana	1.23	1.14	1.49	1.57	2.10
Maine	0.93	1.04	1.65	2.66	1.48
Maryland	0.93	1.21	0.94	2.38	1.73
Massachusetts	1.00	1.05	1.64	2.03	1.74
Michigan	1.57	1.49	1.09		1.03
Minnesota	0.99	1.21	0.97	2.44	1.80
Mississippi	0.89	1.42	0.96		1.76
Missouri	0.92	1.21	1.59	2.74	1.05

State	PIT Elasticity	CIT Elasticity	Sales Elasticity	Gaming Elasticity	PI to GDP Elasticity
Montana	1.43	1.21	1.33	2.10	1.67
Nebraska	0.92	0.99	1.08	0.94	1.80
Nevada			2.92	2.06	1.94
New Jersey	1.50	1.07	1.76	0.23	1.95
New Mexico	1.45	2.30	1.00	2.05	1.86
New York	1.01	1.84	1.65	1.65	1.02
North Carolina	0.95	1.45	0.94		1.03
North Dakota	0.85	1.05	1.76	2.45	2.20
Ohio	1.75	1.03	2.16		1.40
Oklahoma	1.58	0.99	0.93	1.84	1.74
Oregon	0.97	1.02			1.54
Pennsylvania	1.65	1.04	1.76	2.15	1.03
Rhode Island	0.92	1.02	0.97	2.22	1.04
South Carolina	1.48	0.98	1.73		1.04
South Dakota			1.85		1.04
Tennessee	0.32	1.04	0.99		1.64
Texas			1.37	2.30	1.47
Utah	1.48	1.64	2.39		1.84
Vermont	0.96	1.04	1.49		1.83
Virginia	0.94	1.26	0.90		1.84
Washington			1.60		1.03
West Virginia	0.98	1.63	0.94		1.51
Wisconsin	0.95	1.04	1.68		1.39
Wyoming	0.94	1.02	0.95		2.46
Mean	1.13	1.20	1.41	1.94	1.55







# Comparative Losses

	2008 to 2009	Nike Swoosh	Roller Coaster	L-Shaped
Alabama	11.5%	5.3%	10.3%	10.6%
Alaska	46.9%	6.0%	11.6%	12.0%
Arizona	13.7%	6.6%	12.8%	13.3%
Arkansas	0.3%	3.8%	7.3%	7.6%
California	19.3%	4.0%	7.8%	8.1%
Colorado	13.1%	4.2%	8.2%	8.5%
Connecticut	4.4%	5.2%	10.0%	10.4%
Delaware	6.2%	7.8%	15.0%	15.5%
Florida	12.8%	4.7%	9.2%	9.5%
Georgia	10.5%	4.2%	8.1%	8.4%
Hawaii	4.5%	4.4%	8.5%	8.8%
Idaho	15.3%	4.0%	7.8%	8.1%
Illinois	9.1%	5.2%	10.1%	10.4%
Indiana	1.1%	3.7%	7.2%	7.4%
Iowa	2.5%	6.2%	12.0%	12.4%
Kansas	5.4%	6.0%	11.6%	11.9%
Kentucky	2.7%	3.5%	6.7%	6.9%
Louisiana	8.3%	5.9%	11.4%	11.8%
Maine	9.0%	4.5%	8.8%	9.1%
Maryland	4.8%	4.4%	8.5%	8.8%
Massachusetts	12.5%	5.2%	10.1%	10.4%
Michigan	21.3%	4.8%	9.3%	9.6%
Minnesota	8.8%	4.7%	9.1%	9.4%
Mississippi	4.2%	3.7%	7.1%	7.4%
Missouri	6.9%	3.5%	6.7%	6.9%

# Comparative Losses

	2008 to 2009	Nike Swoosh	Roller Coaster	L-Shaped
Montana	7.5%	7.1%	13.7%	14.1%
Nebraska	4.2%	4.3%	8.3%	8.5%
Nevada	10.3%	7.5%	14.5%	15.0%
New Jersey	11.2%	7.0%	13.5%	14.0%
New Mexico	13.2%	5.0%	9.7%	10.0%
New York	1.2%	3.8%	7.4%	7.6%
North Carolina	10.9%	3.0%	5.8%	6.0%
North Dakota	0.5%	5.0%	9.8%	10.1%
Ohio	-0.1%	6.6%	12.8%	13.2%
Oklahoma	7.3%	5.6%	10.8%	11.1%
Oregon	0.9%	4.7%	9.1%	9.4%
Pennsylvania	8.6%	5.0%	9.7%	10.1%
Rhode Island	11.8%	3.4%	6.7%	6.9%
South Carolina	13.3%	4.8%	9.3%	9.6%
South Dakota	2.0%	5.3%	10.3%	10.7%
Tennessee	10.0%	2.8%	5.5%	5.7%
Texas	8.9%	4.0%	7.8%	8.1%
Utah	12.4%	7.8%	15.1%	15.6%
Vermont	9.3%	5.3%	10.3%	10.6%
Virginia	9.2%	4.9%	9.5%	9.8%
Washington	4.1%	4.4%	8.6%	8.8%
West Virginia	0.7%	4.0%	7.7%	7.9%
Wisconsin	7.1%	4.3%	8.4%	8.6%
Wyoming	19.4%	2.5%	4.9%	5.1%
Mean	8.9%	4.8%	9.3%	9.6%

State	2020:Q2	2020:Q3	2020:Q4	2021:Q1	2021:Q2	2021:Q3	2021:Q4
Alabama	625	365	104	-16	-137	-257	-377
Alaska	1,169	1,082	994	954	914	874	833
Arizona	91	-312	-716	-902	-1,088	-1,274	-1,460
Arkansas	45	-97	-239	-305	-370	-436	-502
California	17,696	14,684	11,673	10,283	8,894	7,504	6,114
Colorado	876	572	268	127	-13	-154	-294
Connecticut	1,992	1,444	895	642	390	137	-116
Delaware	59	-134	-327	-416	-505	-594	-683
Florida	637	-207	-1,051	-1,441	-1,830	-2,220	-2,610
Georgia	2,212	1,639	1,066	801	536	272	7
Hawaii	191	2	-187	-274	-361	-449	-536
Idaho	349	267	185	147	109	71	33
Illinois	-1,103	-2,206	-3,308	-3,817	-4,326	-4,835	-5,344
Indiana	1,114	785	456	304	152	0	-152
Iowa	521	262	2	-118	-238	-358	-477
Kansas	-238	-476	-714	-824	-934	-1,044	-1,154
Kentucky	-89	-302	-516	-615	-714	-812	-911
Louisiana	86	-219	-525	-666	-807	-948	-1,089
Maine	224	130	36	-7	-51	-94	-137
Maryland	451	22	-408	-607	-805	-1,003	-1,202
Massachusetts	2,646	1,658	670	214	-242	-698	-1,154
Michigan	872	602	332	207	82	-42	-167
Minnesota	1,813	1,236	659	393	127	-140	-406
Mississippi	249	133	18	-36	-89	-142	-196
Missouri	471	292	113	31	-52	-135	-218
Montana	-34	-133	-231	-277	-322	-368	-413
Nebraska	259	146	33	-20	-72	-124	-176
Nevada	121	-52	-225	-305	-384	-464	-544
New Jersey	-1,027	-2,475	-3,924	-4,592	-5,261	-5,929	-6,598
New Mexico	906	699	491	396	300	205	109
New York	518	-938	-2,395	-3,068	-3,740	-4,413	-5,085
North Carolina	911	507	102	-85	-272	-458	-645
North Dakota	68	-2	-71	-104	-136	-168	-200
Ohio	1,496	291	-914	-1,471	-2,027	-2,583	-3,140
Oklahoma	582	375	169	73	-22	-118	-213
Oregon	1,153	865	576	443	310	177	43
Pennsylvania	-902	-1,839	-2,775	-3,208	-3,640	-4,072	-4,504
Rhode Island	134	59	-16	-50	-85	-120	-154
South Carolina	366	122	-123	-236	-349	-462	-575
South Dakota	126	77	29	6	-16	-38	-61
Tennessee	655	433	211	109	6	-96	-198
Texas	10,943	9,676	8,409	7,824	7,239	6,654	6,070
Utah	370	56	-258	-403	-548	-693	-838
Vermont	179	133	86	65	44	22	1
Virginia	216	-327	-871	-1,122	-1,373	-1,623	-1,874
Washington	1,050	515	-20	-267	-514	-761	-1,007
West Virginia	678	576	473	426	379	332	285
Wisconsin	218	-187	-593	-781	-968	-1,155	-1,343
Wyoming	1,028	1,013	998	991	984	977	971

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# What's Missing

- State Revenue effects will persist beyond 2021
- Local Revenue Effects are significant and lagged
- Scenario's may be optimistic
- Pandemic may be more damaging to most elastic tax instruments
- Estimate ignores increased demand for public goods and services

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