

Estimates of State and Local Government Revenue Losses from Pandemic Mitigation

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This data brief presents estimates of the impacts of the COVID-19 mitigation shutdowns on US state and local income and sales tax revenue. I estimate that revenues will decline by \$54 billion in fiscal year 2020 (FY20). Depending on the speed of the recovery over the next fiscal year, another \$25 billion to \$137 billion of revenue may be lost. If states split their rainy day funds between FY20 and fiscal year 2021 (FY21) to offset these revenue declines, the shortfalls would be reduced to \$21 billion in FY20 and \$4 billion to \$78 billion in FY21.

While every revenue stream collected by state and local governments will probably be reduced by the current economic slowdown, the estimates here focus on the two largest sources: individual income taxes and sales taxes. Together, these taxes account for 60 percent of the revenue states collect. I have used the Current Employment Statistics (CES) and National Income and Product Accounts data to estimate the declines in the income and sales tax bases.

I calculated the declines in industry employment from February 2020 to April 2020 using the BLS Employment Situation Table B-1, which is based on the CES.¹ I matched these declines to industries in the Occupational Employment Statistics (OES).² I estimate the reduction in employment in each occupation and state by multiplying the industry employment declines by the number of employees in each occupation within the industry. I then multiplied the occupation declines by the occupation's mean earnings and arrive at an estimated decline in the state's income tax base. The implied declines in the income tax base varied from 11 percent to 15 percent among states and averaged 12 percent. The variation is driven by differences among states in industry concentrations and occupational earnings.

The views expressed in this report are those of the author and are not necessarily those of the Federal Reserve Bank of Cleveland or the Board of Governors of the Federal Reserve System.

As an example of how the CES data are used to estimate the decline in the income tax base, consider waitstaff in Ohio. The CES data show a 47 percent decline in the number of employees working in the “food and drink places” industry (NAICS 722). Nationally, “food and drink places” employ 87 percent of all waitstaff. Applying the industry decline to the total earnings of waitstaff in Ohio who work in food and drink places (the count times the average earnings) suggests a loss of \$877 million in earnings. I sum these losses for all industry-occupation combinations, and it suggests a decline of \$29 billion. This is 11 percent of the total earnings observed in Ohio in the OES data, so I estimate that Ohio income tax revenue will decline by 11 percent.

CES decline in “food and drink” industry employment	* 0.47	Share of waitstaff who work in “Food service and Drinking Places” industry	* 0.87	Number of waitstaff in Ohio	* 94,720	Mean annual earnings of waitstaff in Ohio	* \$22,650	=	Decline in income tax base in Ohio	= -\$877M
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To estimate reduced sales tax revenue, I used the “Personal Consumption Expenditures by Type of Product” table from the National Income and Product Accounts.³ I selected the line items that are usually subject to sales taxes and observed a 4 percent decline in total expenditures on these line items from 2019:Q4 to 2020:Q1 (seasonally adjusted). I assume all of this decline is due to the shutdowns and it all occurred in the final two weeks of the quarter. This suggests taxable sales declined by 26 percent in these last two weeks. There is no geographic variation in the estimated decline of sales.

Data on state and local finances are collected every five years by the Census of Governments (COG).⁴ I inflation-adjusted the most recent income and sales tax revenues for each state and local government (Census of Governments 2017) and applied the income and sales tax declines. The COG revenue figures include revenues flowing into all funds, not just the government’s general fund. While most discussion of state and local budgets focuses on general funds, using the broad COG definition reflects that revenue losses in other funds might also create urgent demands for resources. Almost all states end their fiscal years on June 30, and this means that they had accrued or collected 73 percent of their FY20 revenue before shutdowns began in mid-March 2020.⁵ They will be collecting taxes from their reduced tax bases during the last quarter of FY20. The estimation calculations assume earnings and sales are suppressed throughout the quarter, but states are beginning to allow some businesses to reopen. To the extent that

earnings and sales rebound during this quarter, the realized revenue losses will likely be less than is estimated here.

In table 1, I present the income and sales tax revenues that are likely to be lost in the remainder of FY20. These total \$42 billion. The losses range from 0.3 percent (Alaska) to 5.5 percent (Texas) of annual own revenue. Because most states operate under balanced budget requirements, they will be forced to reduce spending by an amount equal to the revenue decline during the single remaining quarter of FY20. For example, a state that loses 4 percent of its annual revenue during the fourth quarter must cut 16 percent of the spending it planned to do during that quarter to finish the year in balance.

State governments maintain rainy day funds (RDF) and other unallocated assets that can be used to smooth through declines in revenue. The National Association of State Budget Officers publishes these fund balances annually.⁶ Because FY21 is very likely to be a financially difficult year for states, I have assumed that they will use half of their RDFs in FY20 and the other half in FY21.⁷ The last column of table 1 presents the revenue losses that would not be covered by the RDFs. This substantially reduces revenue shortfalls to \$9 billion.

The lost revenue for local governments is presented in table 2. These estimates are calculated the same way as the state estimates except that I used OES data for the local governments' metro or rural areas instead of the state-level data. The total estimated forgone revenue for local governments in FY20 is \$12 billion. Local governments also maintain RDFs, so the need will be lower than this total implies. However, no good measure of these funds is available, so I am unable to adjust the figures.

Table 3 presents estimates of the FY21 lost revenue under three scenarios. The most optimistic scenario assumes that businesses will begin reopening in May 2020, that most businesses have survived the shutdowns, and that furloughed employees will return to their former employers. In this scenario, the income and sales tax bases reverse half of the shutdown decline by July 2020, and the recovery is complete by October 2020. For the second scenario, I assume the income and sales tax bases take four quarters to recover. This is modeled on the experience of the Great Recession. Personal income reached its recession low in 2009:Q1, and it took four quarters to return to its previous high. Consumer expenditures hit their trough in 2009:Q2 and took three quarters to recover. In the last scenario, I assume half of the declines are reversed by July 2020, but a resurgence of the virus forces the shutdowns to be reimposed in October 2020. The slow recovery described in the second scenario then begins in 2021.

Under the most optimistic scenario, states and local governments will lose \$25 billion in revenue in FY21. They are estimated to lose \$73 billion if we experience a slow recovery and \$137 billion if there is a resurgence of COVID-19. Again, a portion of this can be offset by RDFs, but a majority will have to be matched with spending cuts unless state and local governments receive grants or raise taxes.

Why don't these estimates match my state's announced budget cuts?

These estimates are meant to arrive at the scale of the national aggregate losses. They apply a uniform estimation technique to standardized data so that the relative size of the challenges facing the states can be assessed. They may differ from announced budget cuts for reasons including the following:

- State revenue offices have microdata on their states' tax payers that is not publically available. This detailed data may support higher or lower revenue forecasts.
- States may be forecasting increased revenues in May and June 2020 as businesses reopen. They may announce further cuts if the revenues remain low.
- Tax revenues may have been above or below projections earlier in FY20.
- The estimates here are based on inflation-adjusted values from FY17. A state's actual revenues may have grown faster or slower than inflation.
- States may have changed their tax rates and mix of revenue sources since FY17.
- States may have options to offset revenue shortfalls in addition to using RDF. For example, they may delay payments to vendors or push an employee pay period into FY21.

Table 1. Estimated declines in state revenue in FY20 (\$ millions)

	Revenue type		Total losses as share of ¹		Losses beyond 50% of RDF
	Income	Sales	All Revenue	Own Revenue	
Alabama	166	547	2.5	3.9	137
Alaska	-	18	0.2	0.3	-
Arizona	130	641	2.0	3.4	229
Arkansas	85	327	1.8	2.9	335
California	2,586	3,584	2.0	2.9	-
Colorado	207	367	1.9	2.8	51
Connecticut	239	486	2.4	3.3	-
Delaware	36	39	0.8	1.2	-
Florida	-	2,371	2.6	3.8	994
Georgia	331	613	2.0	3.1	-
Hawaii	81	304	2.7	3.4	-
Idaho	52	155	2.2	3.2	-
Illinois	395	1,296	2.3	3.3	1,382
Indiana	169	766	2.3	3.6	-
Iowa	111	321	1.7	2.2	-
Kansas	70	299	2.0	2.6	32
Kentucky	137	393	1.7	2.9	378
Louisiana	92	471	1.9	3.5	348
Maine	50	151	2.2	3.4	-
Maryland	264	643	2.0	3.0	261
Massachusetts	439	613	1.7	2.5	-
Michigan	447	1,430	2.7	4.0	1,554
Minnesota	332	738	2.4	3.3	-
Mississippi	58	344	1.9	3.4	112
Missouri	189	376	1.8	2.9	91
Montana	38	40	1.1	2.0	-
Nebraska	67	167	2.2	3.2	-
Nevada	-	482	2.9	4.5	114
New Hampshire	2	67	0.8	1.3	18
New Jersey	409	985	2.0	2.8	761
New Mexico	42	213	1.4	2.5	-
New York ²	-	-	-	-	-
North Carolina	370	814	2.0	3.0	-
North Dakota	10	94	1.5	2.1	-
Ohio	254	1,304	2.1	3.2	-
Oklahoma	97	262	1.5	2.3	-
Oregon	265	106	1.1	1.7	-
Pennsylvania	364	1,403	1.9	2.9	1,508
Rhode Island	39	118	1.8	2.8	51
South Carolina	133	323	1.5	2.3	-
South Dakota	-	106	2.3	3.6	11
Tennessee	8	696	2.2	3.6	145
Texas	-	4,893	3.6	5.5	108
Utah	110	246	1.8	2.4	-
Vermont	24	74	1.5	2.2	-
Virginia	376	481	1.7	2.1	166
Washington	-	1,333	2.6	3.8	89
West Virginia	56	186	1.8	2.9	-
Wisconsin	237	555	2.1	2.8	1
Wyoming	-	53	0.9	1.6	-
Total	9,567	32,294			8,876

¹ "All Revenue" includes collections by the state and federal transfers. "Own Revenue" excludes federal transfers.

² New York's FY20 closed on March 31, 2020, so it is not impacted in the estimation scenario.

Sources: Census of Governments, Occupational Employment Statistics, National Association of State Budget Officers, National Income and Product Accounts, Bureau of Labor Statistics Current Employment Statistics, and author's calculations.

Table 2. Estimated declines in local government FY20 revenue (\$ millions)

	Revenue Type		Jurisdiction Type			
	Income	Sales	City and Town	County	Schools	Special
Alabama	4	286	234	56	-	-
Alaska	-	28	22	6	.	-
Arizona	-	236	199	22	-	15
Arkansas	-	140	86	54	-	-
California	-	1,409	964	95	-	350
Colorado	-	519	377	64	-	78
Connecticut	-	-	-	.	-	-
Delaware	-	1	-	-	-	-
District of Columbia	85	189	274	.	.	-
Florida	-	628	237	339	52	-
Georgia	-	391	69	193	128	-
Hawaii	-	30	25	5	.	-
Idaho	-	5	4	1	-	1
Illinois	-	519	247	149	-	123
Indiana	28	13	18	23	-	-
Iowa	3	42	28	8	8	-
Kansas	-	143	92	50	-	-
Kentucky	45	50	58	15	22	-
Louisiana	-	405	153	111	131	10
Maine	-	-	-	-	-	-
Maryland	158	67	26	198	.	-
Massachusetts	-	29	28	1	-	-
Michigan	17	20	32	5	-	-
Minnesota	-	45	37	9	-	-
Mississippi	-	12	9	2	-	-
Missouri	5	278	159	117	-	7
Montana	-	1	1	-	-	-
Nebraska	-	50	46	1	3	-
Nevada	-	118	15	102	-	-
New Hampshire	-	-	-	-	-	-
New Jersey	-	17	17	-	-	-
New Mexico	-	84	56	26	-	2
New York	357	1,627	1,038	942	2	-
North Carolina	-	231	82	150	.	-
North Dakota	-	28	22	6	-	-
Ohio	251	282	255	217	13	48
Oklahoma	-	165	134	31	-	-
Oregon	-	40	32	8	-	-
Pennsylvania	178	110	190	16	81	2
Rhode Island	-	2	2	.	-	-
South Carolina	-	61	25	36	-	-
South Dakota	-	41	39	-	2	-
Tennessee	-	192	83	108	-	-
Texas	-	1,005	734	66	-	206
Utah	-	121	54	67	-	-
Vermont	-	2	2	-	-	-
Virginia	-	210	105	104	-	1
Washington	-	564	257	159	-	148
West Virginia	-	9	6	2	-	-
Wisconsin	-	52	9	37	-	7
Wyoming	-	8	2	7	-	-
Total	1,131	10,505	6,584	3,608	442	998

Sources: Census of Governments, Occupational Employment Statistics, National Income and Product Accounts, Bureau of Labor Statistics Current Employment Statistics, and author's calculations.

Table 3. Declines in income and sales tax revenue under alternate scenarios (\$ billions)

	FY20	FY21		
		V-shaped	Slow	Second wave
State	41.9	21.9	63.1	117.1
Local	11.6	2.7	9.8	20.3
State + Local	53.5	24.6	72.9	137.4
States beyond 50% of RDF	8.9	1.5	18.2	57.5
States beyond 50% of RDF + Local	20.5	4.3	27.9	77.8

Sources: Census of Governments, Occupational Employment Statistics, National Association of State Budget Officers, National Income and Product Accounts, Bureau of Labor Statistics Current Employment Statistics, and author's calculations.

Appendix

I. Assumptions and limitations of the estimates

I have assumed that a 1 percent decline in earnings results in a 1 percent decline in income tax revenue. The OES earnings data reports on individuals, but income taxes are assessed by household. If the earnings losses are concentrated in lower-income households, those states that have progressive income tax brackets will continue to collect closer-to-normal amounts from higher-income households. I have implicitly assumed that investment income declines as much as earned income. Some states tax unemployment insurance benefits, so those states will receive some additional revenue from the CARES Act supplements to benefits.

I have not modeled the declines in revenue from sources such as gambling, tolls, and licensing fees. All of these must be expected to decline to some degree. The estimates do not reflect the variation in timing and extent of the mitigation restriction from state to state. I assume sales and income tax base declines are equal for all the jurisdictions in the same metro or rural area.

If the lost revenue estimated here were replaced, it is possible states would still have to cut budgeted spending because of increases in other expenses. Many recently unemployed people may become eligible for Medicaid and require additional state support. Also, states can borrow from the federal government to refill exhausted unemployment insurance (UI) trust funds, but the states may also consider transferring money from the general fund to the UI trust.

These estimates primarily reflect the mandated shutdowns. An unknown factor is how much consumers and businesses will pull back on their spending as a result of uncertainty and economic hardship caused by the pandemic. This loss of confidence could make any of the recovery scenarios worse. Recent past recessions are limited in what they can teach us because none has required adjusting to a need for social distancing. After September 11, 2001, consumers had to gain confidence that they would not be victimized by a terrorist attack, and in this case, the threat appeared, in theory, to be limited to or at least far more likely to occur at high-profile locations or events. However, COVID-19 is not limited by such parameters, but is both invisible and widespread. We do not know how costly it will be for factories, universities, airports, and concert venues to accommodate social distancing.

II. Estimating calculations

From the OES data before the pandemic, the number of employees in occupation j in state s is

$$employees_{js}$$

The CES employment declines from February to April assign a $covid_employment_reduction$ to each industry i . These are translated into a reduced count of employees in occupation j in state s by multiplying the national shares of workers in occupation j that work in industry i and summing over all industries.

$$employees_reduced_{js} = \sum_i [covid_employment_reduction_i * \frac{employees_{ji}}{employees_j} * employees_{js}]$$

The prepandemic income tax base in state s is the product of the employee count in occupation j in state s and the mean earnings of workers in occupation j in state s , summed over all occupations.

$$income_tax_base_s = \sum_j employees_{js} * mean_earnings_{js}$$

The postpandemic income tax base in state s is estimated the same way, except the reduced employment count in occupation j in state s is used.

$$income_tax_base_reduced_s = \sum_j employees_reduced_{js} * mean_earnings_{js}$$

The annual income tax revenue decline in state s is 1 minus the weighted combination of quarters when the full income tax base is available and quarters when the reduced income tax base is available.

$recovery_d$ is a value defined by the scenario that reflects how much of the decline is in effect in the quarter d . When the economy is operating normally, $recovery_d = 1$. With a full shutdown in place, $recovery_d = 0$.

$$income_tax_revenue_decline_s = \frac{1}{4} \sum_d \left((1 - recovery_d) * \left(1 - \frac{income_tax_base_reduced_s}{income_tax_base_s} \right) \right)$$

The *recovery* values used in the scenarios are as follows:

Calendar Quarter	Fiscal Quarter (most common)	V-Shaped Recovery	Slow (Great Recession-like) recovery	Second Wave Recovery
2019:Q3	2020:Q1	1.00	1.00	1.00
2019:Q4	2020:Q2	1.00	1.00	1.00
2020:Q1	2020:Q3	1.00	1.00	1.00
2020:Q2	2020:Q4	0.00	0.00	0.00
2020:Q3	2021:Q1	0.50	0.25	0.50
2020:Q4	2021:Q2	1.00	0.50	0.00
2021:Q1	2021:Q3	1.00	0.75	0.25
2021:Q2	2021:Q4	1.00	1.00	0.50
2021:Q3	2022:Q1	1.00	1.00	0.75
2021:Q4	2022:Q2	1.00	1.00	1.00

The income tax revenue lost is the product of the income tax revenue decline and the annual income tax revenue for the state. This amount is reported in column 2 of tables 1 and 2.

$$income_tax_revenue_lost_s = income_tax_revenue_decline_s * income_tax_revenue_s$$

The *sales_reduction* variable is the decline in consumption for products subject to sales tax from 2019:Q4 to 2020:Q1. It is multiplied by 13/2 to reflect that the data cover only two weeks of lockdown spending during the quarter. Without data on local sales by product, or other geographic variation, I have to assume that the scenario's *sales_reduction* values are the same for all states.

$$sales_reduction = \frac{13}{2} \left(1 - \frac{taxable_sales_{2020Q1}}{taxable_sales_{2019Q4}} \right)$$

Paralleling the decline in the income tax base, the sales tax revenue decline adjusts for the combination of regular quarters and pandemic-impacted quarters.

$$sales_tax_revenue_decline_s = \frac{1}{4} \sum_d ((1 - recovery_d) * sale_reduction)$$

The sales tax revenue lost is the product of the sales tax revenue decline and the annual sales tax revenue. This amount is reported in column 3 of tables 1 and 2.

$$sales_tax_revenue_lost_s = sales_tax_revenue_decline_s * sale_tax_revenue_s$$

The local government calculations are conducted in exactly the same way except for using OES employment and earnings measures by metro or rural area in place of the state-level values. The OES and COG data can be merged one to one by using the county. All metro and rural areas in the OES data are exclusive groups of counties.

¹ Bureau of Labor Statistics. 2020. “Table B-1. Employees on nonfarm payrolls by industry sector and selected industry detail.” May. [bls.gov/news.release/empsit.t17.htm](https://www.bls.gov/news.release/empsit.t17.htm)

² Bureau of Labor Statistics. 2019. “Occupational Employment Statistics, Table 2.” May. [bls.gov/oes/tables.htm](https://www.bls.gov/oes/tables.htm).

³ Bureau of Economic Analysis. National Income and Product Accounts, Section 2, Table 2.4.5U. apps.bea.gov/iTable/iTable.cfm?ReqID=19&step=2#reqid=19&step=2&isuri=1&1921=underlying.

⁴ Census of Governments. 2017. 2017 State and Local Government Finance Tables. United States Census Bureau. [census.gov/programs-surveys/cog/data/tables.2017.html](https://www.census.gov/programs-surveys/cog/data/tables.2017.html).

⁵ Only four states end their fiscal year on a date other than June 30: New York (March 31), Texas (August 31), Alabama and Michigan (September 30).

⁶ National Association of State Budget Officers. 2019. “Fiscal Survey of the States: Overview.” (Fall). [nasbo.org/reports-data/fiscal-survey-of-states](https://www.nasbo.org/reports-data/fiscal-survey-of-states).

⁷ If a state’s estimated revenue losses are less than half of its RDF and other unallocated fund balances, I assume it offsets all of the revenue loss in FY20 and carries the remaining funds into FY21. In FY21, it uses as much of the RDF as it needs in each scenario.