Distribution of State Income Tax and Sales Tax Liabilities Across Incomes

The state personal income tax and sales tax are the two state taxes most widely applicable to individuals in the state, applying to earned and unearned income, as well as much of the spending of that income[1]. This brief explores the distribution of state personal income tax and state sales tax liabilities across resident income strata. The report will first focus on the income tax, then the sales tax, and then the combination of the two taxes. Estimates of these liabilities are based on a personal income tax microsimulation model, with the model extended to also include estimates of sales tax liabilities. Households and population represented are proxied by the number of state income tax returns filed, and the number of personal and dependent exemptions claimed on those returns. The income concept utilized is federal adjusted gross income (FAGI) reported on returns, stratified in the model across various subsets of tax-filers, and summarized in this brief. State income tax liabilities are based on actual state income tax filer data and are generated directly by the model[2]. Sales taxable expenditures are estimated from Consumer Expenditure Survey data compiled by the U.S. Department of Labor, and then combined with the microsimulation model to generate state sales tax liabilities across income strata. While any such estimates will be imperfect, the results reported here appear reasonable and intuitive, and can serve as rough approximations of these liabilities and their distribution across income strata.

Individual Income Tax

The table below summarizes 2019 tax year personal income tax data for nearly all resident state income tax filers, by thirty FAGI rows.

DISTRIBUTION OF STATE PERSONAL INCOME TAX LIABILITY
ALL RESIDENT FILERS
TAX YEAR 2019 TAX RETURNS

Cumu. Return %	Federal Gross	Adjusted Income	Number Returns	Exemption Count[4]	Average FAGI[1]	% FAGI Sbjt To Tax[2]	Average Tax Liability	Effective Tax Rate[3]
4.9%	$0	$5,000	87,303	122,243	$2,637	90%	$1	0%
11.0%	$5,000	$10,000	107,961	172,722	$7,564	91%	$40	0.5%
19.8%	$10,000	$15,000	155,743	303,836	$12,557	92%	$106	0.8%
28.3%	$15,000	$20,000	151,645	320,433	$17,427	90%	$249	1.4%
35.7%	$20,000	$25,000	130,868	267,455	$22,420	89%	$404	1.8%
42.2%	$25,000	$30,000	114,808	237,596	$27,422	87%	$553	2.0%
52.7%	$30,000	$40,000	186,264	387,275	$34,740	85%	$769	2.2%
60.8%	$40,000	$50,000	144,754	302,120	$44,764	83%	$1,057	2.4%
67.1%	$50,000	$60,000	112,576	245,055	$54,791	81%	$1,334	2.4%
72.2%	$60,000	$70,000	89,386	210,598	$64,820	79%	$1,636	2.5%
76.3%	$70,000	$80,000	73,563	186,798	$74,830	78%	$1,941	2.6%
79.8%	$80,000	$90,000	62,404	168,033	$84,835	79%	$2,248	2.6%
82.9%	$90,000	$100,000	53,617	151,265	$94,858	79%	$2,563	2.7%
87.7%	$100,000	$120,000	85,252	249,111	$109,403	80%	$3,072	2.8%
91.0%	$120,000	$140,000	58,892	178,134	$129,376	80%	$3,868	3.0%
93.3%	$140,000	$160,000	40,879	126,763	$149,399	80%	$4,708	3.2%
94.9%	$160,000	$180,000	27,826	87,545	$169,330	79%	$5,571	3.3%
95.9%	$180,000	$200,000	19,141	60,695	$189,434	79%	$6,431	3.4%
97.5%	$200,000	$250,000	27,004	85,644	$221,682	78%	$7,824	3.5%
98.2%	$250,000	$300,000	13,370	42,775	$272,910	77%	$10,033	3.7%
98.7%	$300,000	$350,000	7,844	25,037	$323,104	76%	$12,230	3.8%
98.9%	$350,000	$400,000	5,129	16,423	$373,218	75%	$14,365	3.8%
99.1%	$400,000	$450,000	3,640	11,746	$423,314	75%	$16,411	3.9%
99.3%	$450,000	$500,000	2,566	8,215	$473,474	73%	$18,325	3.9%
99.5%	$500,000	$600,000	3,532	11,641	$545,931	72%	$21,103	3.9%
99.6%	$600,000	$700,000	2,222	7,291	$645,701	71%	$25,036	3.9%
99.7%	$700,000	$800,000	1,505	4,939	$746,586	70%	$28,748	3.9%
99.8%	$800,000	$900,000	1,026	3,366	$847,632	69%	$32,518	3.8%
99.8%	$900,000	$1,000,000	726	2,351	$947,833	69%	$36,501	3.9%
100.0%	$1,000,000	plus	3,581	11,464	$2,123,452	64%	$79,531	3.7%
			1,775,027	4,008,569				
Approx. % of HHs & Pop [5]:			102%	86%				

1 FAGI stands for federal adjusted gross income; the starting point for the state income tax return.
2 % FAGI Subject To Tax is taxable income divided by FAGI. Taxable income is FAGI after the standard deduction/personal exemptions and Schedule E adjustsments to income (primarily deductions).
3 Effective tax rate is tax liability divided by federal adjusted gross income. It reflects the overall tax imposed, inclusive of the actual taxable income base and the marginal tax rate structure.
4 Exemption Count is the sum of personal exemptions for taxpayers + spouses + dependents claimed on tax returns.
5 Return count and exemption count are utilized as proxies for households and population represented. Total households and population from U.S. Census Bureau: 2015-2019 average for households, and as of July 2019 estimate for population.
Discrepancies: Over 58,000 returns with FAGI <=$0 not included in the table above (if over 69,000 filers & dependents were included, table would reflect 88% of population). Census household definition ≠ household proxy utilized in table above, with return count slightly larger than household count of 1,739,497.

Distribution of State Income Tax and Sales Tax Liabilities Across Incomes

Income tax returns appear fairly representative of the population of households and individuals in the state. While the filer count is an imperfect proxy for households, it is essentially the same as the Census Bureau count of households in the state. The number of persons claimed on returns exhibits a larger discrepancy, reflecting 86% of the Census population estimate of the state. A small amount of this discrepancy is explained by the omission in the table of filers reporting zero or less FAGI. The balance of the population discrepancy likely reflects segments of the population that are not required to and/or do not file tax returns[3].

The table above is a high-level aggregation and summary of income tax data for over 1.7 million returns in just thirty rows of income. While the average FAGI for returns reflected in each row is fairly close to the mid-point of each row's FAGI range (in most cases less than one-half of one percent deviation), the returns in each row reflect a variety of filing statuses and filing circumstances[4]. Comparisons of average filer results in any particular row to an actual known filer must keep those aggregations in mind.

In addition, the extreme low and high FAGI rows of the table must be viewed with some additional caution. At the low-income extreme, over 58,000 returns were filed reporting zero or negative FAGI. While those returns are explicitly not included in the table above, the ability of some tax-filers to generate very low FAGI likely influences the first few income rows to some extent. At the high-income extreme, the top row of the table of FAGI of $1 million or more, the range of income of the row is not fixed, but is open-ended. Thus, the average results reflected in that row are not likely to be very meaningful for the filers contained in the row.

The right side of the table presents the average tax liability and effective tax rate for the returns in each row. The tax computation starts with FAGI, and then subtracts the applicable standard deduction and personal exemptions, as well as any federal income tax deduction and excess federal itemized deduction[5]. Schedule E adjustments to income (most of which are deductions from FAGI) are also accounted for[6]. The result is taxable income, against which the state's tax rate and bracket structure[7] is applied to generate the average tax liability of each row. The share of FAGI that is subject to tax is presented in the column labeled "% FAGI Sbjt To Tax", and is simply taxable income divided by FAGI. The effective tax rate is the resulting tax liability divided by the FAGI starting point of the computation. All tax filers have the standard deduction, personal exemptions, and federal income tax deduction available to them. Only filers that itemize on their federal returns have the excess federal itemized deduction available to them, and only tax filers

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[3] Other than noncompliance, the primary reason for not filing a state return is that the filing of a federal tax return is not required. Generally, a federal return is not required if income is less than the applicable standard deduction.

[4] Filing statuses include single, married filing separate, joint, qualifying widower, and head-of-household. Other filing circumstances include filing with and without schedule E adjustments to income, and with and without federal itemized deductions, as well as variations in family size and any other factors relevant to a tax situation.

[5] FAGI is reduced by the standard deduction: $4,500 for single and married filing separate filers, $9,000 for joint, qualifying widower, and head-of-household filers. Personal exemptions of $1,000 are deducted for each 65 or older person, blind person, or dependent. Federal income taxes paid are deducted, and any taxpayer that itemized deductions on their federal return can deduct the excess of those deductions over their federal standard deduction from their state return.

[6] Of 29 adjustments to income available on 2019 tax year returns, 24 deduct from FAGI (96% of total adjustment tax value) while only 4 add back to FAGI. The final result after deductions and adjustments to income is state taxable income, which will be lower than FAGI.

[7] The state applies a tax rate of 2% to taxable income up $12,5000 of single and married filing separate filers and $25,000 of joint, qualifying widowers, and head-of-household filers, 4% on the next $37,500 and $75,000 of taxable income, respectively, and 6% on taxable income over $50,000 and $100,000, respectively.

Distribution of State Income Tax and Sales Tax Liabilities Across Incomes

with eligible adjustments to income have any of those adjustments available to them[8]. In addition, it should be noted that the tax estimates above are estimates of income tax liability. While based on actual tax filing data, no accounting for avoidance of liability has been considered[9].

An interesting result of the state personal income tax system falls out of the interaction of the progressive rate and bracket structure (see footnote 7) and the unlimited deductions for federal income taxes paid and excess federal itemized deductions[10]. While the effective tax rate rises through much of the FAGI ranges, the share of FAGI subject to tax falls significantly throughout those ranges. This results in the effective tax rate essentially leveling off at about $400,000 of FAGI, with no appreciable increase in progressivity of the income tax after that. This result is depicted in the chart below[11].
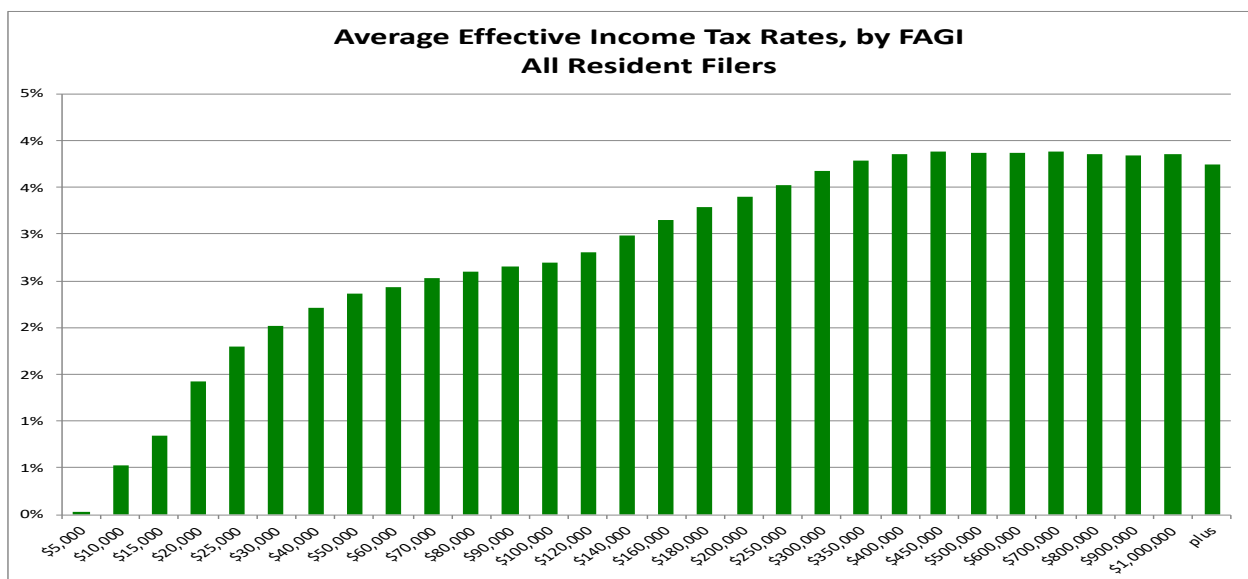
The summary table below contains the incremental total amount and percent share of FAGI and tax liability for each income row as a group, as well as the accumulation of these incremental amounts and shares through the income rows. These cumulative values are the basis of another metric and graphic that summarizes the distribution of tax burden across income strata, known as the Suits index and a curve labeled here as the Suits Curve. These summaries are depicted and discussed below.

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[8] For 2019 tax returns, only about 7% of resident state filers itemized on their federal returns, and thus had the excess federal itemized deduction available to them. About 38% of resident state tax filers had at least one Schedule E adjustment available to them.

[9] Additionally, these are estimates of tax table liability before credits. Tax provisions generating tax table liability are generally applicable to all filers, while credits are unique to the particular circumstances of a taxpayer and credit provision.

[10] The federal Tax Cuts and Jobs Act of 2017 (TCJA) was first effective for personal income taxes with the 2018 tax year, and reduced the state deduction for federal income taxes paid by some 13% on 2019 tax year returns compared to 2017 returns. Excess federal itemized deductions were reduced some 69%. While reducing the level of these deductions, they are still essentially unlimited in that state law does not provide a maximum allowable dollar amount for these deductions as it does for the standard deduction ($4,500/$9,000) and personal exemptions ($1,000). Thus, whatever amount is available from federal tax returns is allowable on state tax returns, and higher income filers have proportionally higher amounts of these deductions.

[11] As mentioned in the text and depicted in the graph, the effective tax rates calculated at the very low and very high extremes appear less reliable than at other income strata.

Distribution of State Income Tax and Sales Tax Liabilities Across Incomes

DISTRIBUTION OF STATE PERSONAL INCOME TAX LIABILITY
ALL RESIDENT FILERS
TAX YEAR 2019 TAX RETURNS

Federal Gross	Adjusted Income	Aggregate FAGI	FAGI %	Cumulative FAGI	Cumu. FAGI %	Aggregate Tax Liability	Liab. %	Cumulative Tax Liability	Cumu. Liab. %
$0	$5,000	$230,212,402	0.2%	$230,212,402	0.2%	$77,774	0.0%	$77,774	0.0%
$5,000	$10,000	$816,604,580	0.7%	$1,046,816,982	0.9%	$4,267,047	0.1%	$4,344,821	0.1%
$10,000	$15,000	$1,955,623,736	1.7%	$3,002,440,718	2.6%	$16,475,986	0.5%	$20,820,807	0.6%
$15,000	$20,000	$2,642,693,974	2.3%	$5,645,134,692	4.9%	$37,736,865	1.1%	$58,557,672	1.8%
$20,000	$25,000	$2,934,046,376	2.6%	$8,579,181,068	7.5%	$52,854,782	1.6%	$111,412,454	3.4%
$25,000	$30,000	$3,148,260,524	2.8%	$11,727,441,592	10.3%	$63,473,222	1.9%	$174,885,676	5.3%
$30,000	$40,000	$6,470,795,450	5.7%	$18,198,237,042	15.9%	$143,285,846	4.4%	$318,171,522	9.7%
$40,000	$50,000	$6,479,716,496	5.7%	$24,677,953,538	21.6%	$152,951,187	4.7%	$471,122,709	14.3%
$50,000	$60,000	$6,168,153,508	5.4%	$30,846,107,046	27.0%	$150,175,144	4.6%	$621,297,853	18.9%
$60,000	$70,000	$5,793,987,451	5.1%	$36,640,094,497	32.0%	$146,200,467	4.4%	$767,498,320	23.3%
$70,000	$80,000	$5,504,702,493	4.8%	$42,144,796,990	36.8%	$142,805,583	4.3%	$910,303,903	27.7%
$80,000	$90,000	$5,294,014,071	4.6%	$47,438,811,061	41.5%	$140,280,447	4.3%	$1,050,584,350	32.0%
$90,000	$100,000	$5,085,995,765	4.4%	$52,524,806,826	45.9%	$137,413,142	4.2%	$1,187,997,492	36.1%
$100,000	$120,000	$9,326,841,130	8.2%	$61,851,647,956	54.1%	$261,929,177	8.0%	$1,449,926,669	44.1%
$120,000	$140,000	$7,619,236,556	6.7%	$69,470,884,512	60.7%	$227,811,217	6.9%	$1,677,737,886	51.0%
$140,000	$160,000	$6,107,284,796	5.3%	$75,578,169,308	66.1%	$192,469,251	5.9%	$1,870,207,137	56.9%
$160,000	$180,000	$4,711,788,682	4.1%	$80,289,957,990	70.2%	$155,004,969	4.7%	$2,025,212,106	61.6%
$180,000	$200,000	$3,625,952,849	3.2%	$83,915,910,839	73.4%	$123,090,188	3.7%	$2,148,302,294	65.3%
$200,000	$250,000	$5,986,307,348	5.2%	$89,902,218,187	78.6%	$211,268,808	6.4%	$2,359,571,102	71.8%
$250,000	$300,000	$3,648,806,748	3.2%	$93,551,024,935	81.8%	$134,136,290	4.1%	$2,493,707,392	75.8%
$300,000	$350,000	$2,534,429,328	2.2%	$96,085,454,263	84.0%	$95,929,739	2.9%	$2,589,637,131	78.8%
$350,000	$400,000	$1,914,233,271	1.7%	$97,999,687,534	85.7%	$73,677,388	2.2%	$2,663,314,519	81.0%
$400,000	$450,000	$1,540,861,784	1.3%	$99,540,549,318	87.0%	$59,736,501	1.8%	$2,723,051,020	82.8%
$450,000	$500,000	$1,214,933,952	1.1%	$100,755,483,270	88.1%	$47,022,124	1.4%	$2,770,073,144	84.2%
$500,000	$600,000	$1,928,226,628	1.7%	$102,683,709,898	89.8%	$74,536,463	2.3%	$2,844,609,607	86.5%
$600,000	$700,000	$1,434,746,919	1.3%	$104,118,456,817	91.0%	$55,631,058	1.7%	$2,900,240,665	88.2%
$700,000	$800,000	$1,123,612,192	1.0%	$105,242,069,009	92.0%	$43,266,171	1.3%	$2,943,506,836	89.5%
$800,000	$900,000	$869,670,450	0.8%	$106,111,739,459	92.8%	$33,363,916	1.0%	$2,976,870,752	90.5%
$900,000	$1,000,000	$688,126,656	0.6%	$106,799,866,115	93.4%	$26,499,664	0.8%	$3,003,370,416	91.3%
$1,000,000	plus	$7,604,081,566	6.6%	$114,403,947,681	100.0%	$284,801,334	8.7%	$3,288,171,750	100.0%
		$114,403,947,681				$3,288,171,750			

Income Tax

DISTRIBUTION OF TAX BURDEN: SUITS CURVE
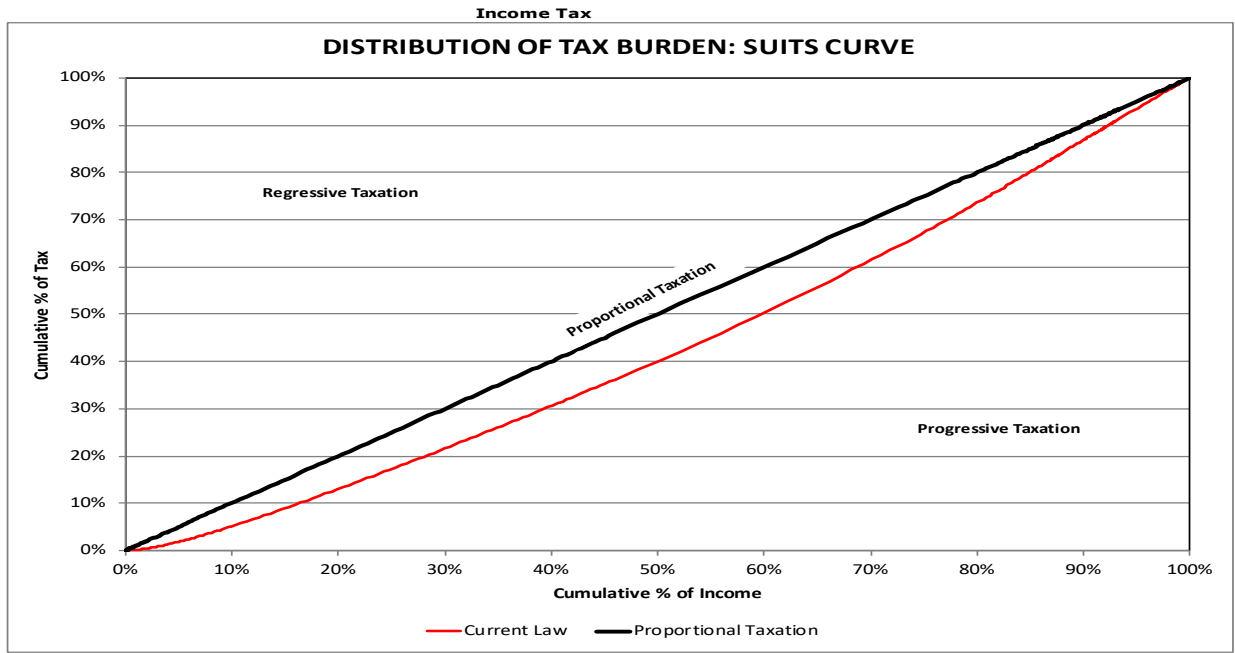
Current Suits Index (S) = 0.1371   S > 0 reflects a progressive tax

The data and graph above depict the cumulative percentage of tax liability associated with the cumulative percentage of FAGI, from the lowest FAGI to the highest FAGI. Along the diagonal line, each cumulative percentage of tax is associated with the identical cumulative percentage of FAGI. For example, the bottom 10% of income pays 10% of the tax, the bottom 20% pays 20%, the bottom 30% pays 30% and so on, and the diagonal represents a distribution of tax burden that would be proportional to income. The actual personal income tax data plots out the current law line of observed tax burden distribution. A progressive tax distribution plots a line below the

diagonal where, for example, the bottom 10% of income pays less than 10% of the tax, the bottom 20% pays less than 20%, the bottom 30% pays less than 30% and so on.

The Suits[12] index is a metric that summarizes the entire distribution of tax burden depicted in the graph above. In this case the Suits Index (S) = 0.1371 (13.71%), and is the share of area of the bottom-right triangle that lies between the diagonal and the observed line of cumulative tax burden. An observed line below the diagonal reflects progressive taxation where lower income shares pay lower shares of the tax, and higher income shares pay higher shares of the tax. The farther the observed line lies into the bottom-right triangle the more progressive the tax, and the larger positive the Suits Index measure of the degree of progressivity[13].

Aa can be seen in the Suits graph, and summarized by the Suits index value, the state individual income tax exhibits a modest degree of progressivity. As seen the effective tax rate graph above, the progressivity is all in the income ranges up to $400,000, before leveling off. While little progressivity is exhibited above that income, essentially 99% of filers are within income ranges up to that level.

A supplement to the Suits Index, is a metric that this brief will refer to as the Palma-Suits Index[14], the ratio of the tax liability share of the top 10% of filers to that of the bottom 40% of filers. Whereas the Suits index reflects the entire distribution of the tax liability and is sentive to the middle of the distribution, the Palma-Suits Index reflects the top and bottom ends of the distribution and ignores the middle. In practice, in a progressive tax system, it measures the multiple of liability of the top 10% of filers relative to bottom 40% of filers. With regard to 2019 income tax liabilities, the Palma-Suits Index = 11.58; the top 10% of filers have an aggregate income tax liability that is nearly twelve times the aggregate liability of the bottom 40% of filers. Given that the Palma Ratio for 2019 FAGI is 4.64, the individual income tax appears to reflect a meaningful degree of progressivity, even with that progressivity flattening out for filers with FAGI above about $400,000 (approximately the top 15% of filers).

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[12] The Suits Index is credited to American economist Daniel B. Suits, who applied the common summary metric and graphic depiction of income distribution of the Gini coefficient and Lorenz Curve to the analysis of tax burden distributions.

[13] The index is defined as 1 minus the ratio of the area below the observed line to the area of the entire bottom-right triangle of the graph. The more progressive the tax burden, the smaller that ratio becomes (the larger the area between the diagonal and the observed line), and the closer the index value gets to S =1. At a value of S = 1, the area below the observed line is zero (the entire bottom-right triangle is within the area of progressivity), making the observed line the equivalent of the right-angle segments of the bottom-right triangle of the graph, and the single highest income filer is paying the entire income tax. An observed distribution of tax burden that lied along the diagonal would have an index value of S = 0; the area below the observed line equals the area of the bottom-right triangle, with no area of progressive taxation beneath the diagonal, and the tax burden would be perfectly proportional.

[14] Similar to Suuts index being an application of the Gini coefficient, from income distribution analysis, to the analysis of tax liability distribution, the Palma-Suits Index of this brief is an application of the Palma Ratio, also from income distribution analysis, to the analysis of tax liability distribution. The Palma Ratio (top 10% / bottom 40%) is named for the Chilean economist Jose Gabriel Palma, and has been popularized in income distribution analysis by the British economists Alex Cobham and Andy Sumner.

Distribution of State Income Tax and Sales Tax Liabilities Across Incomes

General State Sales Tax

The table below summarizes 2019 estimated sales tax liabilities for state residents by the same thirty FAGI rows as utilized in the discussion of income tax above.

ESTIMATED DISTRIBUTION OF STATE SALES TAX LIABILITY
INCOME TAX FILINGS AS PROXY FOR HOUSEHOLDS

Cumu. Return %	Federal Gross	Adjusted Income	Number Returns	Exemption Count	Average FAGI[1]	Curr Effec Tax Rate[2]	State Sales Taxes; 4.45%
4.9%	$0	$5,000	87,303	122,243	$2,637	6.02%	$159
11.0%	$5,000	$10,000	107,961	172,722	$7,564	2.86%	$216
19.8%	$10,000	$15,000	155,743	303,836	$12,557	2.30%	$289
28.3%	$15,000	$20,000	151,645	320,433	$17,427	1.96%	$342
35.7%	$20,000	$25,000	130,868	267,455	$22,420	1.66%	$373
42.2%	$25,000	$30,000	114,808	237,596	$27,422	1.51%	$413
52.7%	$30,000	$40,000	186,264	387,275	$34,740	1.35%	$470
60.8%	$40,000	$50,000	144,754	302,120	$44,764	1.22%	$546
67.1%	$50,000	$60,000	112,576	245,055	$54,791	1.15%	$631
72.2%	$60,000	$70,000	89,386	210,598	$64,820	1.12%	$725
76.3%	$70,000	$80,000	73,563	186,798	$74,830	1.09%	$819
79.8%	$80,000	$90,000	62,404	168,033	$84,835	1.07%	$910
82.9%	$90,000	$100,000	53,617	151,265	$94,858	1.05%	$999
87.7%	$100,000	$120,000	85,252	249,111	$109,403	1.15%	$1,256
91.0%	$120,000	$140,000	58,892	178,134	$129,376	1.16%	$1,501
93.3%	$140,000	$160,000	40,879	126,763	$149,399	1.12%	$1,669
94.9%	$160,000	$180,000	27,826	87,545	$169,330	1.07%	$1,813
95.9%	$180,000	$200,000	19,141	60,695	$189,434	1.02%	$1,940
97.5%	$200,000	$250,000	27,004	85,644	$221,682	0.95%	$2,113
98.2%	$250,000	$300,000	13,370	42,775	$272,910	0.86%	$2,348
98.7%	$300,000	$350,000	7,844	25,037	$323,104	0.78%	$2,535
98.9%	$350,000	$400,000	5,129	16,423	$373,218	0.72%	$2,697
99.1%	$400,000	$450,000	3,640	11,746	$423,314	0.67%	$2,840
99.3%	$450,000	$500,000	2,566	8,215	$473,474	0.63%	$2,962
99.5%	$500,000	$600,000	3,532	11,641	$545,931	0.57%	$3,129
99.6%	$600,000	$700,000	2,222	7,291	$645,701	0.51%	$3,315
99.7%	$700,000	$800,000	1,505	4,939	$746,586	0.47%	$3,476
99.8%	$800,000	$900,000	1,026	3,366	$847,632	0.43%	$3,618
99.8%	$900,000	$1,000,000	726	2,351	$947,833	0.39%	$3,738
100.0%	$1,000,000	plus	3,581	11,464	$2,123,452	0.21%	$4,394
			1,775,027	4,008,569			
	% of HHs & Pop :		102%	86%			

Based on Consumer Expenditure Survey data for the southeast region, compiled by the U.S. Dept of Labor. Estimated expenditures on traditional sales-taxable goods & services. Does not include expenditures on food at home, residential utilities, prescription drugs, or vehicle purchases, nor expenditures by tourists or businesses.
Estimates of expenditure-based sales tax liability, without regard to any ability to avoid actual tax payment.
Number of income tax returns, filers, spouses, and dependent exemptions utilized as proxies for resident consumer households and population.
Does not include 58,061 returns (3.1% of total returns) reporting FAGI <= $0.
Estimates at the lowest and highest income cohorts tend to exhibit distorted results.
1 FAGI stands for federal adjusted gross income; the starting point for the state income tax return, and the income concept utilized for this analysis.
2 Effective (Effec) tax rate is tax liability divided by FAGI. It reflects the overall tax liability imposed.

It should be noted that the tax estimates above[15] are estimates of sales tax liability, based on estimates of sales taxable expenditures. No accounting for avoidance of liability through remote purchases has been considered[16].

Sales tax estimates are based on the Consumer Expenditure Survey for the southeast region, compiled by the Bureau of Labor Statistics of the U.S. Department of Labor, for purposes of the Consumer Price Index. Categories of expenditure encompassing sales taxable goods and services, excluding vehicle purchases, were evaluated for their relationship to the survey's household income. That relationship was applied to income tax microsimulation model averages of FAGI and personal exemption counts to estimate average sales taxable expenditures of the average household proxied in each FAGI row. Those expenditure estimates were multiplied by the state 4.45% sales tax rate to generate estimates of state general sales tax liability by FAGI strata[17].

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[15] The discussion regarding the utilization of income tax filings as proxies for households and population, how representative this data is of household income situations, and the peculiarities of the very lowest and very highest income rows applies here in the analysis of sales tax liabilities, as well.

[16] The avoidance of sales tax liability through remote purchases is possible, but is a diminishing possibility as an increasing number of remote vendors and transactions are being brought into sales tax compliance, both voluntarily and through enforcement.

[17] The income-expenditure relationship was estimated with a linear ordinary least squares equation for incomes up to approximately $100,000, and with a logarithmic equation for higher incomes. This accounted for the observed nearly proportionate growth of sales taxable expenditures with income at lower income levels, but slower expenditure growth with income at higher income levels. Family size was roughly accounted for by applying the division of the linear equation constant by the weighted average number of persons in all households of the survey to the filer personal exemption counts.

Distribution of State Income Tax and Sales Tax Liabilities Across Incomes

Below is a chart of the effective sales tax rate by income strata presented in the table above. While the state's sales tax rate is 4.45% of taxable sales, that tax liability is paid from overall income. Thus, the effective tax rates depicted here are the total amount of estimated sales tax liability divided by FAGI for each stratum, and will be lower than the legal sales tax rate.

Estimated Effective Sales Tax Rates, by FAGI
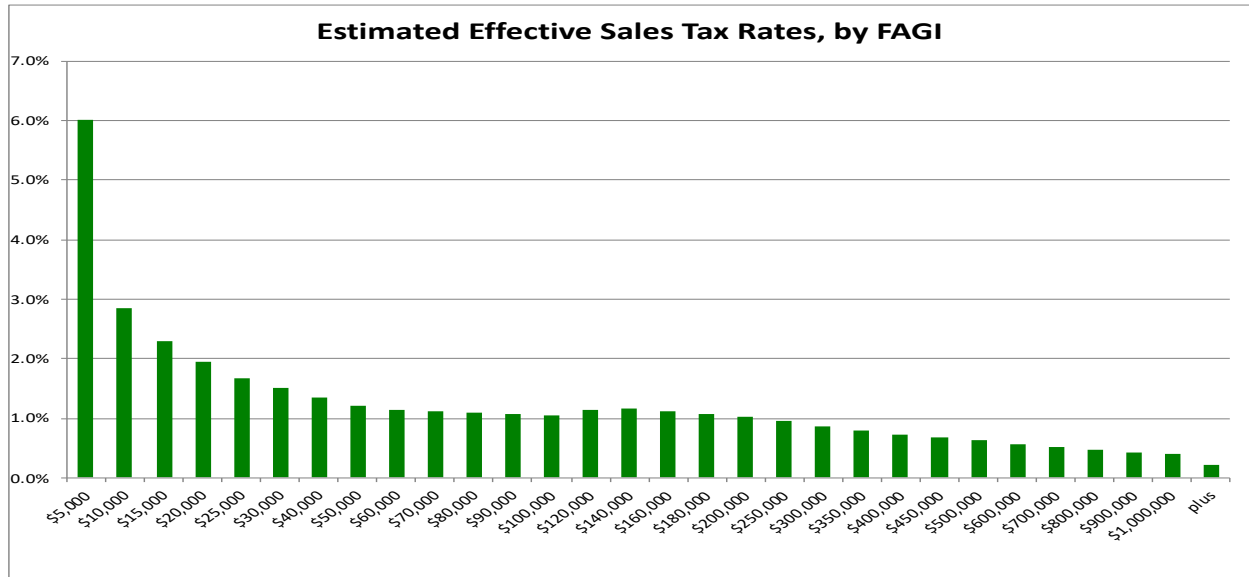
Intuitive in the chart above is the regressive nature of sales taxes, in that while lower income households tend to pay lower total dollar amounts of sales tax, the sales tax they pay tends to make up a higher share of their total income from which the tax is paid[18]. The regressive nature of sales taxes is reflected above in the general decline of the effective tax rate as incomes rise.

As with the income tax analysis, a summary table of estimated sales tax containing the incremental total amount and percent share of FAGI, and tax liability for each income row as a group, as well as the accumulation of these incremental amounts and shares through the income rows is displayed below. These cumulative values are the basis of the Suits Index and curve summarizing the distribution of sales tax burden across income strata. The summary incremental and cumulative estimated sales tax liabilities are depicted below first, followed by the Suits depiction of the tax liability distribution that the numerical table underlies.

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[18] Note the distinctly higher sales tax rate at the lowest income stratum. Relatively higher effective rates are expected at lower incomes, but the sharply higher rate exhibited at that income in particular is suggestive of the distortions inherent in the model at the income extremes. While less obvious at the very highest income range, a noticeable step-down in the effective rate is evidence of distortion at that income extreme, as well.

Distribution of State Income Tax and Sales Tax Liabilities Across Incomes

ESTIMATED DISTRIBUTION OF STATE SALES TAX LIABILITY

INCOME TAX FILINGS AS PROXY FOR HOUSEHOLDS

Federal Adjusted Gross Income		Aggregate FAGI	FAGI %	Cumulative FAGI	Cumu. FAGI %	Aggregate Tax Liability	Liab. %	Cumulative Tax Liability	Cumu. Liab. %
$0	$5,000	$230,212,402	0.2%	$230,212,402	0.2%	$13,867,730	1.1%	$13,867,730	1.1%
$5,000	$10,000	$816,604,580	0.7%	$1,046,816,982	0.9%	$23,319,911	1.9%	$37,187,641	3.0%
$10,000	$15,000	$1,955,623,736	1.7%	$3,002,440,718	2.6%	$44,958,622	3.6%	$82,146,263	6.6%
$15,000	$20,000	$2,642,693,974	2.3%	$5,645,134,692	4.9%	$51,814,360	4.2%	$133,960,623	10.8%
$20,000	$25,000	$2,934,046,376	2.6%	$8,579,181,068	7.5%	$48,770,129	3.9%	$182,730,752	14.7%
$25,000	$30,000	$3,148,260,524	2.8%	$11,727,441,592	10.3%	$47,433,542	3.8%	$230,164,294	18.6%
$30,000	$40,000	$6,470,795,450	5.7%	$18,198,237,042	15.9%	$87,470,391	7.1%	$317,634,685	25.6%
$40,000	$50,000	$6,479,716,496	5.7%	$24,677,953,538	21.6%	$79,093,748	6.4%	$396,728,433	32.0%
$50,000	$60,000	$6,168,153,508	5.4%	$30,846,107,046	27.0%	$71,072,449	5.7%	$467,800,881	37.7%
$60,000	$70,000	$5,793,987,451	5.1%	$36,640,094,497	32.0%	$64,818,337	5.2%	$532,619,218	42.9%
$70,000	$80,000	$5,504,702,493	4.8%	$42,144,796,990	36.8%	$60,264,649	4.9%	$592,883,867	47.8%
$80,000	$90,000	$5,294,014,071	4.6%	$47,438,811,061	41.5%	$56,806,233	4.6%	$649,690,101	52.4%
$90,000	$100,000	$5,085,995,765	4.4%	$52,524,806,826	45.9%	$53,566,094	4.3%	$703,256,195	56.7%
$100,000	$120,000	$9,326,841,130	8.2%	$61,851,647,956	54.1%	$107,109,446	8.6%	$810,365,640	65.3%
$120,000	$140,000	$7,619,236,556	6.7%	$69,470,884,512	60.7%	$88,374,581	7.1%	$898,740,222	72.5%
$140,000	$160,000	$6,107,284,796	5.3%	$75,578,169,308	66.1%	$68,207,668	5.5%	$966,947,889	78.0%
$160,000	$180,000	$4,711,788,682	4.1%	$80,289,957,990	70.2%	$50,434,996	4.1%	$1,017,382,886	82.0%
$180,000	$200,000	$3,625,952,849	3.2%	$83,915,910,839	73.4%	$37,131,877	3.0%	$1,054,514,763	85.0%
$200,000	$250,000	$5,986,307,348	5.2%	$89,902,218,187	78.6%	$57,062,475	4.6%	$1,111,577,238	89.6%
$250,000	$300,000	$3,648,806,748	3.2%	$93,551,024,935	81.8%	$31,391,472	2.5%	$1,142,968,710	92.1%
$300,000	$350,000	$2,534,429,328	2.2%	$96,085,454,263	84.0%	$19,888,025	1.6%	$1,162,856,735	93.7%
$350,000	$400,000	$1,914,233,271	1.7%	$97,999,687,534	85.7%	$13,833,570	1.1%	$1,176,690,305	94.9%
$400,000	$450,000	$1,540,861,784	1.3%	$99,540,549,318	87.0%	$10,337,323	0.8%	$1,187,027,628	95.7%
$450,000	$500,000	$1,214,933,952	1.1%	$100,755,483,270	88.1%	$7,600,765	0.6%	$1,194,628,393	96.3%
$500,000	$600,000	$1,928,226,628	1.7%	$102,683,709,898	89.8%	$11,051,005	0.9%	$1,205,679,398	97.2%
$600,000	$700,000	$1,434,746,919	1.3%	$104,118,456,817	91.0%	$7,365,079	0.6%	$1,213,044,477	97.8%
$700,000	$800,000	$1,123,612,192	1.0%	$105,242,069,009	92.0%	$5,232,065	0.4%	$1,218,276,542	98.2%
$800,000	$900,000	$869,670,450	0.8%	$106,111,739,459	92.8%	$3,711,830	0.3%	$1,221,988,372	98.5%
$900,000	$1,000,000	$688,126,656	0.6%	$106,799,866,115	93.4%	$2,713,776	0.2%	$1,224,702,147	98.7%
$1,000,000 plus		$7,604,081,566	6.6%	$114,403,947,681	100.0%	$15,734,970	1.3%	$1,240,437,117	100.0%
		$114,403,947,681				$1,240,437,117			

The data above underlies the graph below depicting the cumulative percentage of estimated sales tax liability associated with the cumulative percentage of FAGI, from the lowest FAGI to the highest FAGI. Along the diagonal line in the graph, each cumulative percentage of tax is associated with the identical cumulative percentage of FAGI. For example, the bottom 10% of income pays 10% of the tax, the bottom 20% pay 20%, the bottom 30% pays 30% and so on, and the diagonal represents a distribution of tax burden that would be proportional. The estimated sales tax data plots out the current observed tax burden distribution. A regressive tax distribution plots a line above the diagonal where, for example, the bottom 10% of income pays more than 10% of the tax, the bottom 20% pays more than 20%, the bottom 30% pays more than 30% and so on.

Distribution of State Income Tax and Sales Tax Liabilities Across Incomes

Sales Tax

DISTRIBUTION OF TAX BURDEN: SUITS CURVE

Current Suits Index (S) =   (0.1905)   S < 0 reflects a regressive tax
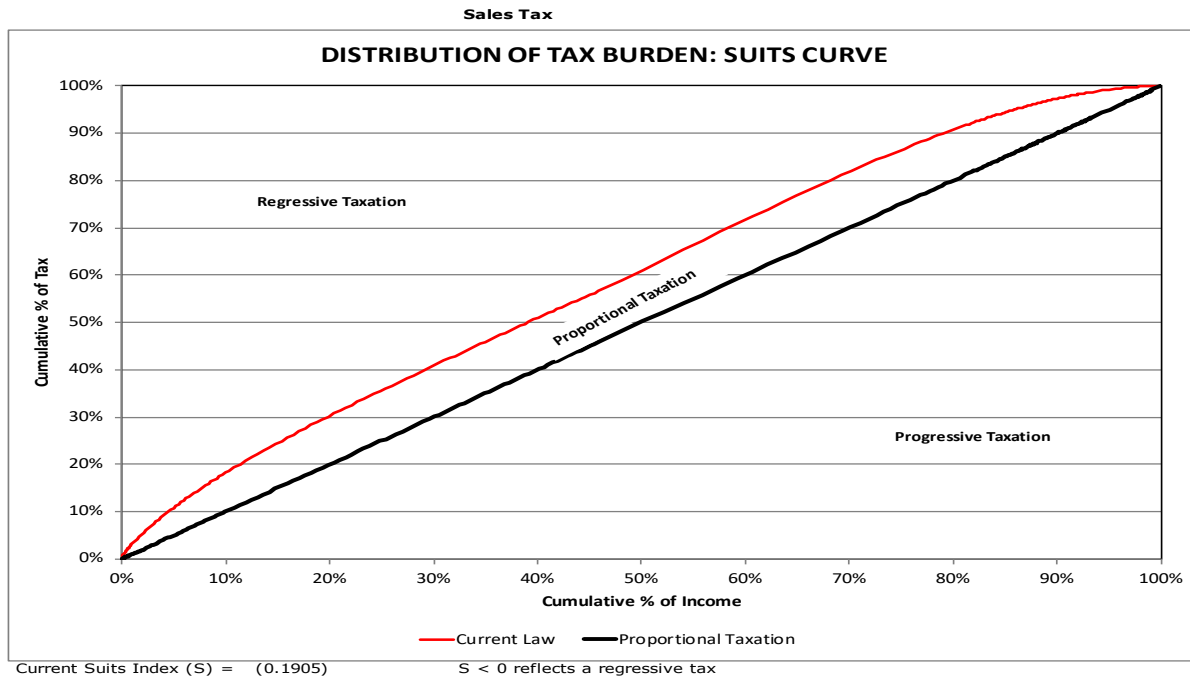
Again, the Suits Index summarizes the entire distribution of tax burden depicted in the graph above. In this case the Suits Index (S) = -0.1905 (-19.05%), and its absolute value is the share of area of the bottom-right triangle that lies between the diagonal and the observed line of cumulative tax burden. An observed line above the diagonal reflects regressive taxation where lower cumulative income shares pay higher cumulative shares of the tax, and higher cumulative income shares pay lower cumulative shares of the tax[19]. The more the observed line lies into the upper-left triangle the more regressive the tax, and the larger the absolute value of the Suits Index measure of the degree of regressivity.

The Palma-Suits Index, discussed above, supplements the Suits Index result with a value of 1.81 for the general sales tax; the top 10% of filers have an aggregate sales tax liability that is just under twice the aggregate liability of the bottom 40% of filers. The top 10% of filers have a small multiple of the liability of the bottom 40% of filers because, even though sales taxable expenditures make up a larger share of total spending by lower income households, the total amount of sales taxable spending of the top 10% still exceeds that of the bottom 40%. However, the fact that the ratio is much smaller than for the income tax, is indicative of the fact that the sales tax is much less progressive than the income tax and, as indicated by the negative sign of the Suits Index, is a regressive tax.

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[19] As footnoted above, the index is defined as 1 minus the ratio of the area below the observed line to the area of the entire bottom-right triangle of the graph. In the case of a regressive tax, that area embodies some area of the upper-left triangle as well as all of the area of the bottom-right triangle. This allows the sign of the index to indicate progressivity versus regressivity. The more regressive the tax burden, the more the ratio of the two areas exceeds 1, and 1 minus that ratio is a negative value. The more regressive the tax becomes (the larger the area between the diagonal and the observed line above the diagonal), and the closer the index value gets to S = -1. At a value of S = -1, the area below the observed line is 2 times the area of the bottom-right triangle (both the upper-left and bottom-right triangles are within the area of regressivity), making the observed line the equivalent of the right-angle segments of the upper-left triangle of the graph, and the single lowest income filer is paying the entire sales tax. An observed distribution of tax burden that lied along the diagonal would have an index value of S = 0; the area below the observed line equals the area of the bottom-right triangle, with no area of regressive (or progressive) taxation beneath the diagonal, and the tax would be perfectly proportional.

Distribution of State Income Tax and Sales Tax Liabilities Across Incomes

Combined Income and Sales Tax

The combination of the individual income tax and the general sales tax provides estimates of the distribution of two of the most important state-level taxes to residents and households within the state. The table below summarizes 2019 combined estimated tax liabilities for state residents by the same thirty FAGI rows as utilized in the discussion above.

ESTIMATED DISTRIBUTION OF COMBINED STATE INCOME & SALES TAX LIABILITY

INCOME TAX FILINGS AS PROXY FOR HOUSEHOLDS

Cumu. Return %	Federal Adjusted Gross Income		Number Returns	Exemption Count	Average FAGI	Comb Effec Tax Rate	State Income & Sales Tax
4.9%	$0	$5,000	87,303	122,243	$2,637	6.06%	$160
11.0%	$5,000	$10,000	107,961	172,722	$7,564	3.38%	$256
19.8%	$10,000	$15,000	155,743	303,836	$12,557	3.14%	$394
28.3%	$15,000	$20,000	151,645	320,433	$17,427	3.39%	$591
35.7%	$20,000	$25,000	130,868	267,455	$22,420	3.46%	$777
42.2%	$25,000	$30,000	114,808	237,596	$27,422	3.52%	$966
52.7%	$30,000	$40,000	186,264	387,275	$34,740	3.57%	$1,239
60.8%	$40,000	$50,000	144,754	302,120	$44,764	3.58%	$1,603
67.1%	$50,000	$60,000	112,576	245,055	$54,791	3.59%	$1,965
72.2%	$60,000	$70,000	89,386	210,598	$64,820	3.64%	$2,361
76.3%	$70,000	$80,000	73,563	186,798	$74,830	3.69%	$2,760
79.8%	$80,000	$90,000	62,404	168,033	$84,835	3.72%	$3,158
82.9%	$90,000	$100,000	53,617	151,265	$94,858	3.76%	$3,562
87.7%	$100,000	$120,000	85,252	249,111	$109,403	3.96%	$4,329
91.0%	$120,000	$140,000	58,892	178,134	$129,376	4.15%	$5,369
93.3%	$140,000	$160,000	40,879	126,763	$149,399	4.27%	$6,377
94.9%	$160,000	$180,000	27,826	87,545	$169,330	4.36%	$7,383
95.9%	$180,000	$200,000	19,141	60,695	$189,434	4.42%	$8,371
97.5%	$200,000	$250,000	27,004	85,644	$221,682	4.48%	$9,937
98.2%	$250,000	$300,000	13,370	42,775	$272,910	4.54%	$12,381
98.7%	$300,000	$350,000	7,844	25,037	$323,104	4.57%	$14,765
98.9%	$350,000	$400,000	5,129	16,423	$373,218	4.57%	$17,062
99.1%	$400,000	$450,000	3,640	11,746	$423,314	4.55%	$19,251
99.3%	$450,000	$500,000	2,566	8,215	$473,474	4.50%	$21,287
99.5%	$500,000	$600,000	3,532	11,641	$545,931	4.44%	$24,232
99.6%	$600,000	$700,000	2,222	7,291	$645,701	4.39%	$28,351
99.7%	$700,000	$800,000	1,505	4,939	$746,586	4.32%	$32,225
99.8%	$800,000	$900,000	1,026	3,366	$847,632	4.26%	$36,136
99.8%	$900,000	$1,000,000	726	2,351	$947,833	4.25%	$40,239
100.0%	$1,000,000 plus		3,581	11,464	$2,123,452	3.95%	$83,925
			1,775,027	4,008,569			
	% of HHs & Pop :		102%	86%			

The table above simply sums the income tax liability and general sales tax liability for each income row in the preceding tables, and recalculates the effective tax rate of the sum of both taxes as a percentage of FAGI. The combined effective tax rate is depicted in the graph below.

Distribution of State Income Tax and Sales Tax Liabilities Across Incomes
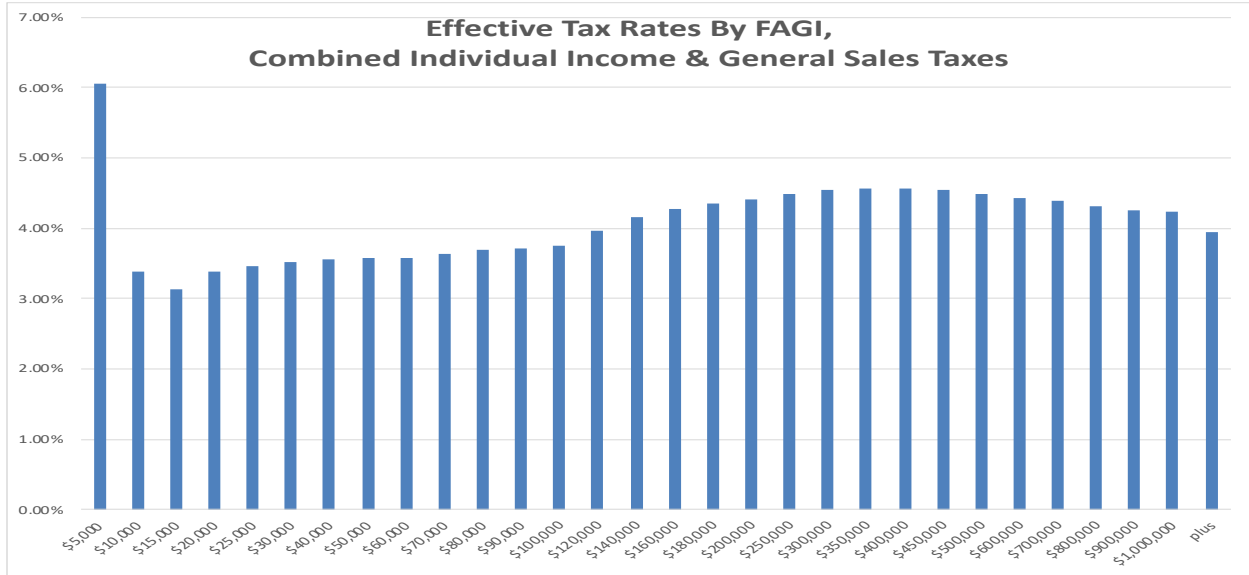
The combined effective tax rate is generally mildly upward sloping to about the $350,000 - $400,000 FAGI range, reflecting the dominance of the income tax in the distribution of the two taxes combined. The combined distribution can also be observed in the Suits curve graph and summarizing index below.
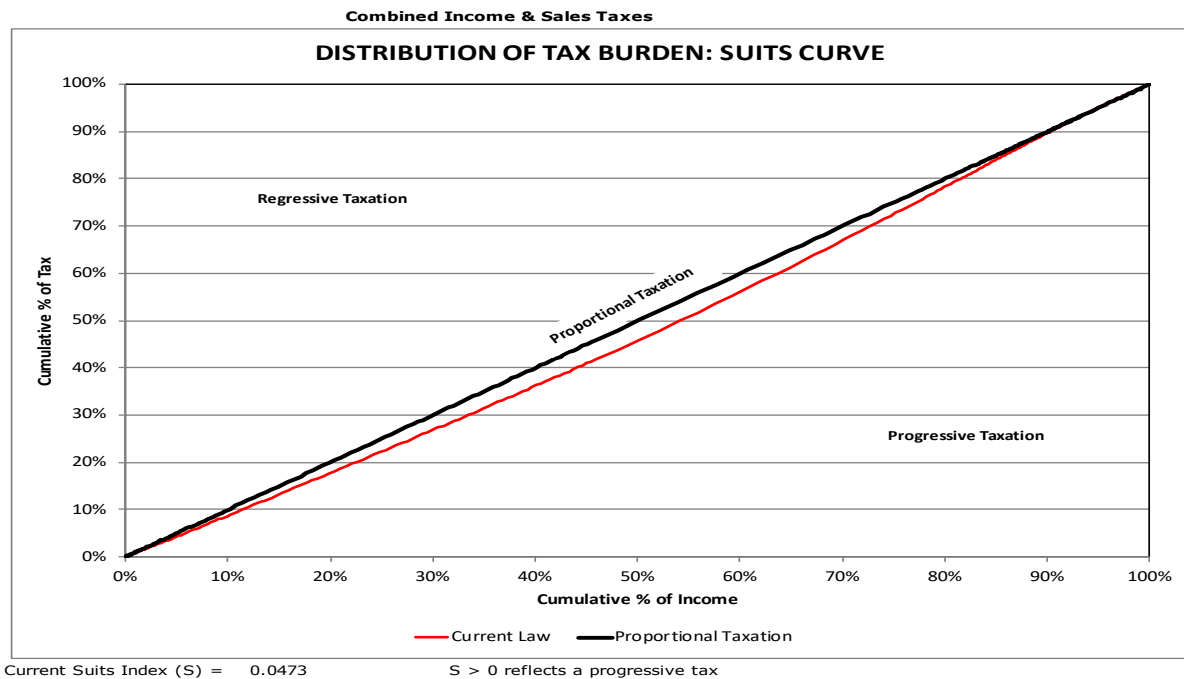
In the graph above, it can be seen that the combined state individual income tax and general sales tax exhibits an observed line of progressivity slightly below the diagonal. The Suits index value of 0.0473, indicates an area of progressivity of 4.73% of the area of the bottom-right triangle. While still progressive, it is notable that the progressivity is quite small, and the two taxes combined reflect considerably more proportionality than either tax separately.

It is also notable that the combined index value is not simply the sum of the two separate indexes. If that were the case, the combined index would be -0.0534, implying a combined regressivity. Actually, the combined index is a weighted sum of the two values, reflecting the relative size of the two taxes aggregate effective tax rates across all income strata. From the tables above displaying cumulative FAGI and tax liability, the aggregate effective tax rate of the two taxes can be calculated. For the individual income tax, the total tax liability is some 2.87% of total FAGI (73% of the combined effective rate). For the general sales tax, it is some 1.08% (27% of the combined effective rate). Summing the products of these percentages applied to their respective index values, at full precision, results in a small combined progressivity, measured by a Suits index value of 0.0473.

The Palma-Suits Index for the combined taxes equals 5.84; the top 10% of filers have an aggregate combined income and sales tax liability that is just under six times the aggregate combined liability of the bottom 40% of filers. While, over the entire distribution of the combined taxes, the regressiveness of the sales tax is offset by the progressiveness of the income tax, resulting in mildly progressive combined taxation, or even nearly proportional combined taxation, the progessiveness of the income tax is still evident in a material multiple of combined liability for the top 10% of filers relative to that of the bottom 40% of filers.

Finally, it should be realized that both the Suits Index and the Palma-Suits Index (coined in this brief) are summary measures of the distribution of tax liability. They allow the aggregate effect of particular tax policies to be compared, but the effects on particular income stratum can be significantly different than the aggregate effect. A more complete understanding of the distribution of tax burden requires an evaluation of tax distribution tables containing a number of income strata, as well as observed indexes and curves. This brief serves to provide an initiating understanding of the distribution of these two important taxes for individuals and households in the state**.**