



Income Tax Progressivity in Ohio



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Executive Summary

Economic research shows that a high degree of income tax progressivity

- ❖ **Harms** economic growth
- ❖ **Increases** the variability of a state's income tax revenue

In other words, a state with a highly progressive income tax code, such as Ohio's, will have lower economic growth and greater swings in income tax revenue than states with less progressive income tax systems.

In 2000, Ohioans paid **\$725.91** in state income taxes for every man, woman, and child in the state, compared to the United States average of \$692.80. In terms of progressivity, by various measures, Ohio has

- ❖ The **sixth** most progressive state income tax for single filers;
- ❖ The **nineteenth** for married filers; and
- ❖ The **fifth** when calculated as the difference between the top and bottom rate.

The study empirically examines the relationship between income tax progressivity and economic growth and finds that *Ohio's highly progressive income tax has a strong, negative impact on economic growth.*

In addition, progressivity increases the volatility of Ohio's income tax revenue. For example, if Ohio's economic activity fell by 10 percent during a recession, the state's income tax revenue would fall by 12.2 percent.

Thus, Ohio's highly progressive income tax has helped sow the seeds of the current state budget shortfall. To reduce the progressivity of the Ohio income tax, thereby mitigating the negative effects of progressivity on economic growth and tax revenue variability, policymakers can

- ❖ *Compress* the marginal tax rate structure by reducing the number of brackets or reducing the spread between the top and bottom tax rates.
- ❖ *Decrease* the level of the standard deductions and personal exemptions.
- ❖ *Allow* taxpayers to deduct federal income tax liability from their Ohio taxable income.

From the standpoint of economic growth, lowering and compressing tax rates are the preferred reforms.

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1. Introduction

Individual income taxes are the single largest source of tax revenue in Ohio. In 2000, individual income taxes provided roughly \$2 billion more in revenue than did the state's second largest revenue source, the state retail sales tax. The individual income tax in Ohio accounts for almost 42 percent of state tax revenue, which is slightly higher than the national average of 36 percent. Thus, Ohio relies a bit more heavily on the individual income tax as a revenue source than do most other states. From the standpoint of the average Ohioan, this translates into a higher individual income tax burden than would be faced in most other states. Per capita, Ohioans paid \$725.91 in state income taxes for every man, woman, and child in the state, while the U.S. average is \$692.80.¹

One of the most important characteristics of an income tax, in terms of its economic effects, is the structure of the tax brackets and tax rates within these brackets. Typically, an income tax will have several tax brackets, and the tax rate faced by an individual rises as he moves into each higher tax bracket. How rapidly the tax rate rises with income determines the degree to which the income tax is considered "progressive." Ohio's income tax is generally regarded as highly progressive given its seven tax brackets with marginal tax rates ranging from 0.74 percent (on taxable income below \$5,000) up to 7.50 percent (on taxable income above \$200,000). The result of this tax structure is that in 1998, the top fifth of the income tax filers paid 71 percent of the state income tax, whereas the bottom half of the income tax filers paid just 6 percent of the total tax.² In this study, we compare Ohio's income tax with other states, paying particular attention to the issue of progressivity in the state's income tax.

2. Measuring Income Tax Progressivity

Before proceeding, it is important to explain exactly how income tax progressivity is typically defined and measured. A tax is considered progressive if the percentage of income paid in taxes rises as one's income rises.³ If a family making \$50,000 paid \$5,000 in state income taxes, for example, they would be paying 10 percent of their income in state income taxes. This percentage is known as the family's average tax rate (ATR).⁴ The income tax is considered progressive if a higher income family making, say, \$100,000 of income would have to pay *more* than 10 percent of their income (or more than \$10,000) in taxes.⁵ So a tax is progressive if the average tax rate rises as income rises.

The more rapidly the average tax rate rises with income, the greater the degree of progressivity in the income tax. If, using the previous example, the family making \$100,000 had to pay 20 percent of their income (or \$20,000) in taxes, the tax code would be considered more progressive than if they had to pay only 15 percent (or \$15,000) in taxes.

Because of the complex interactions among different features of the tax code (such as the impact of deductions), the only reasonable method that can be used to compare state income tax codes is to take a particular family's characteristics and actually compute the amount of state income tax that would be owed by the family in every different state, if the family had lived there. While this is no easy task, two studies in the mid-1990s did precisely this. The first of these studies, prepared by the Minnesota Department of Revenue's Tax Research Division, computed these tax burdens at 10 different income levels for every state using data for the 1994 tax year.⁶ These were calculated for different representative taxpayers, including both single and married taxpayers. Based on calculations from their data, Table 1 presents the average tax rates for five different income levels for married filers with two wage earners.

Income Tax Progressivity in Ohio

**Table 1 - State Average Income Tax Rates Computed
from Minnesota Tax Study**

Percentage of Income Owed in State Income Tax for Married Filers with Two Earners
with Combined Income of

State	\$10,000	\$25,000	\$50,000	\$100,000	\$200,000
Alabama	0.94%	2.89%	3.25%	3.23%	3.08%
Arizona	0.00%	1.20%	2.36%	3.12%	4.08%
Arkansas	0.00%	2.02%	3.37%	4.46%	5.26%
California	0.00%	0.19%	2.02%	4.52%	6.16%
Colorado	0.00%	1.77%	3.20%	3.71%	4.07%
Connecticut	0.00%	0.04%	2.14%	4.50%	4.50%
Delaware	0.15%	2.02%	3.50%	4.75%	5.68%
District of Col.	0.00%	4.39%	5.13%	6.46%	7.31%
Georgia	-0.32%	2.57%	3.68%	4.36%	4.78%
Hawaii	-2.27%	3.01%	5.30%	6.83%	7.17%
Idaho	-0.50%	1.31%	4.24%	5.53%	6.39%
Illinois	1.80%	2.52%	2.76%	2.88%	2.94%
Indiana	2.04%	2.86%	3.13%	3.26%	3.33%
Iowa	0.00%	2.82%	3.84%	4.53%	5.13%
Kansas	0.00%	1.68%	2.60%	3.96%	4.75%
Kentucky	0.82%	3.01%	4.07%	4.56%	4.88%
Louisiana	0.00%	1.30%	2.03%	2.19%	2.44%
Maine	0.00%	1.02%	3.49%	5.31%	6.31%
Maryland	0.00%	4.12%	5.22%	5.76%	6.22%
Massachusetts	0.00%	3.82%	4.75%	5.30%	5.62%
Michigan	0.72%	2.97%	3.72%	4.10%	4.28%
Minnesota	-3.79%	2.10%	4.27%	5.49%	6.50%
Mississippi	0.00%	1.02%	2.35%	3.28%	3.79%
Missouri	0.07%	1.88%	3.23%	3.80%	4.48%
Montana	0.45%	1.89%	3.15%	4.30%	5.22%
Nebraska	0.00%	1.45%	2.81%	4.36%	5.68%
New Jersey	0.95%	1.52%	1.95%	3.16%	4.77%
New Mexico	-0.40%	0.81%	2.25%	4.00%	5.54%
New York	-1.90%	1.93%	4.63%	5.74%	6.54%
North Carolina	0.00%	2.88%	4.34%	5.11%	5.93%
North Dakota	0.00%	0.74%	1.23%	1.98%	2.79%
Ohio	0.00%	1.51%	2.79%	4.15%	5.34%
Oklahoma	0.00%	2.55%	3.89%	4.89%	5.38%
Oregon	0.00%	4.06%	5.50%	6.53%	7.13%
Pennsylvania	0.00%	2.80%	2.80%	2.80%	2.80%
Rhode Island	0.00%	1.41%	2.41%	3.90%	5.47%
South Carolina	0.00%	1.08%	3.67%	4.67%	5.43%
Utah	0.00%	2.22%	4.26%	4.80%	5.10%
Vermont	-6.32%	1.28%	2.19%	3.54%	4.98%
Virginia	0.36%	2.32%	3.48%	4.13%	4.54%
West Virginia	0.62%	2.33%	3.39%	4.86%	5.68%
Wisconsin	-4.99%	3.35%	4.81%	5.49%	5.81%

Notes: States not levying a general individual income tax in 1994 were: Alaska, Florida, Nevada, New Hampshire, South Dakota, Tennessee, Texas, Washington, and Wyoming. Negative numbers reflect income tax credits that result in low-income families receiving refunds larger than the amount of tax withheld. These data are calculated from Comparison of 1994 Individual Income Tax Burdens by State, published by the Minnesota Department of Revenue Tax Research Division available at <http://www.ctj.org/>.

The second study computing tax burdens across states was jointly prepared by the Citizens for Tax Justice and The Institute on Taxation and Economic Policy (hereafter referred to as the CTJ study).⁷ Unlike the Minnesota study, however, they compute the tax burdens only for one family type (non-elderly married couple). In addition, rather than taking a specific given level of income and computing the taxes owed on it across states, they compare the taxes owed by the average family in each income quintile. Thus, for each state, family incomes are ranked from highest to lowest, and they are divided into five equal-sized groups. The average income in each of these groupings is then used as the basis for the tax calculation. So the data for the tax burden for a taxpayer in the second quintile are based on different levels of income across states, but these differences reflect the different income distributions in the states. In Ohio, for example, the tax burden for the second quintile is calculated at an income of \$33,900, while for Alabama it is computed at an income of \$26,500. Table 2 presents the average income tax rates for all five quintiles from this study.

Measuring how progressive the state's income tax structure is requires an estimate of exactly how rapidly the average tax rates in Tables 1 and 2 rise with income. For both the single and married taxpayers in the Minnesota tax study, and for the married family in the CTJ study, we compute the average change in the percent of income paid in taxes per \$10,000 worth of income across all the data observations given in the study.⁸ The larger this number, the higher degree of progressivity the state income tax code exhibits. These computations are presented in Table 3, and for each a ranking of the states is provided from the highest degree of progressivity (rank of one) to the lowest. All the estimates are positive, indicating that all of the states have progressive income taxes.⁹ For comparison, we have also provided a simpler measure of income tax progressivity: the difference between the marginal tax rate in the highest tax bracket and in the lowest bracket. While this simpler measure is frequently cited, it does not incorporate information about any of the exemptions, deductions, or credits that are in the state tax code.

The data presented in Table 3 suggest that Ohio has a relatively progressive income tax code, especially for single taxpayers. Ohio ranks easily in the top 10 when the simple measure, top rate minus bottom rate, or the single taxpayer data are used. For the married taxpayer data, Ohio's progressivity still remains in the top half of the 42 states considered.¹⁰ At no point does Ohio's relative ranking on income tax progressivity drop below twentieth.

Overall, the results indicate that for every \$10,000 in additional income, the average tax burden increases by between 0.248 and 0.281 percentage points. The degree to which Ohio differs from neighboring states such as Illinois, Indiana, Michigan, and Pennsylvania is even more striking. ***Ohio's income tax code is significantly more progressive, by any measure, than are the tax codes of all of Ohio's neighboring states.*** In fact, for these neighboring states the highest rank obtained by any measure for any of the other states was 36, which is far below Ohio's ranking. Because Ohio competes for its tax base most vigorously with these neighboring states, this is the most important comparison. The data clearly show that Ohio's income tax code is very progressive relative to the neighboring states with which it competes.

Income Tax Progressivity in Ohio

Table 2 - State Average Income Tax Rates Computed from CTJ Tax Study

Percentage of Income Owed in State Income Tax For Non-elderly Married Couples with Income

State	Lowest Quintile	Second Quintile	Third Quintile	Fourth Quintile	Highest Quintile
Alabama	1.80%	2.80%	3.20%	3.20%	2.96%
Arizona	0.10%	1.20%	1.70%	2.20%	2.60%
Arkansas	0.60%	2.20%	2.80%	3.50%	4.34%
California	0.10%	0.60%	1.60%	2.50%	4.34%
Colorado	1.00%	2.40%	3.10%	3.40%	3.61%
Connecticut	0.50%	2.10%	3.30%	3.90%	4.16%
Delaware	2.40%	3.60%	4.10%	4.70%	5.18%
District of Col.	3.40%	5.00%	5.40%	6.10%	6.61%
Georgia	0.90%	2.80%	3.50%	3.80%	4.03%
Hawaii	2.50%	4.00%	4.80%	5.20%	5.70%
Idaho	-0.10%	1.60%	3.10%	4.10%	5.00%
Illinois	1.70%	2.40%	2.50%	2.50%	2.50%
Indiana	2.70%	3.10%	3.30%	3.40%	3.45%
Iowa	1.50%	3.30%	4.00%	4.30%	4.79%
Kansas	1.00%	2.00%	2.50%	3.20%	3.93%
Kentucky	2.10%	4.10%	5.10%	5.50%	5.64%
Louisiana	0.30%	1.20%	1.90%	2.20%	2.40%
Maine	0.50%	1.70%	2.90%	3.90%	4.93%
Maryland	3.20%	5.00%	5.40%	5.60%	5.72%
Massachusetts	2.90%	4.40%	4.80%	5.00%	5.24%
Michigan	2.40%	3.40%	3.70%	3.90%	3.99%
Minnesota	0.90%	3.20%	4.20%	4.90%	5.54%
Mississippi	0.10%	1.00%	2.00%	2.40%	3.06%
Missouri	1.30%	2.90%	3.50%	3.90%	4.28%
Montana	0.70%	1.90%	2.70%	3.30%	4.22%
Nebraska	0.60%	1.60%	2.30%	3.00%	3.98%
New Jersey	1.20%	1.70%	1.90%	2.30%	3.79%
New Mexico	-0.80%	0.60%	1.70%	2.70%	3.87%
New York	0.90%	3.80%	5.20%	6.10%	6.96%
North Carolina	1.00%	2.90%	3.90%	4.40%	4.93%
North Dakota	0.10%	0.70%	1.10%	1.30%	1.86%
Ohio	2.20%	3.60%	4.20%	4.70%	5.46%
Oklahoma	0.00%	2.20%	3.30%	4.00%	4.35%
Oregon	2.70%	4.70%	5.40%	6.10%	6.48%
Pennsylvania	2.40%	3.30%	3.50%	3.60%	3.44%
Rhode Island	0.60%	2.10%	2.50%	3.00%	3.94%
South Carolina	0.10%	1.20%	2.80%	3.80%	4.48%
Utah	1.10%	2.70%	3.60%	4.10%	4.44%
Vermont	-0.20%	1.70%	2.20%	2.60%	3.58%
Virginia	1.70%	2.90%	3.40%	3.80%	4.07%
West Virginia	1.00%	2.20%	2.90%	3.40%	4.25%
Wisconsin	1.10%	3.90%	4.70%	5.10%	5.33%

Notes: States not levying a general individual income tax in 1994 were: Alaska, Florida, Nevada, New Hampshire, South Dakota, Tennessee, Texas, Washington, and Wyoming. Negative numbers reflect income tax credits that result in low-income families receiving refunds larger than the amount of tax withheld. These data are calculated from Who Pays?, published by Citizens for Tax Justice available at <http://www.ctj.org/>.

Income Tax Progressivity in Ohio

Table 3 - Measures of State Income Tax Progressivity

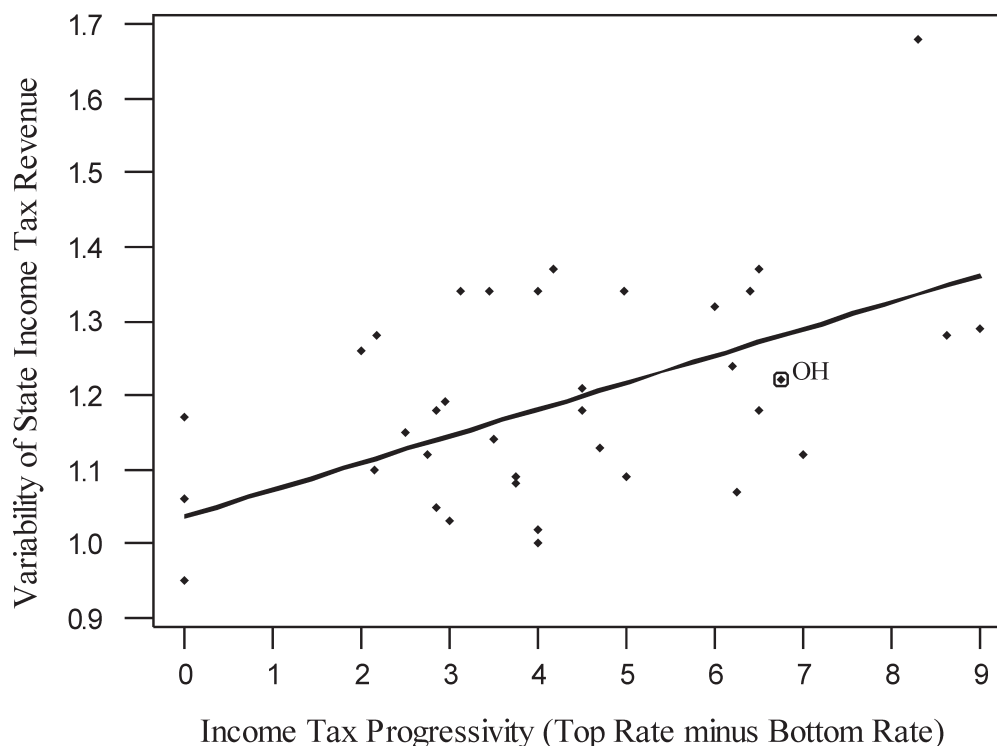
Change in Average Tax Rate per \$10,000 of Income Top Bracket Rate minus Bottom Bracket Rate

State	Single (MN data)	Rank	Married (MN data)	Rank	Married (CTJ data)	Rank	Difference	Rank
Alabama	0.010	41	0.096	40	0.071	39	3.00	27
Arizona	0.180	24	0.220	30	0.191	28	2.17	33
Arkansas	0.224	14	0.261	23	0.347	6	6.00	11
California	0.390	1	0.361	8	0.260	19	8.30	3
Colorado	0.108	36	0.218	31	0.162	31	0.00	37
Connecticut	0.239	11	0.291	18	0.118	35	1.50	36
Delaware	0.213	17	0.292	17	0.199	25	3.75	22
District of Col.	0.200	19	0.358	9	0.083	38	4.30	17
Georgia	0.148	30	0.259	24	0.197	26	5.00	12
Hawaii	0.219	15	0.484	3	0.232	23	7.00	4
Idaho	0.249	8	0.390	6	0.471	1	6.20	10
Illinois	0.014	40	0.057	42	0.029	42	0.00	37
Indiana	0.016	39	0.064	41	0.057	40	0.00	37
Iowa	0.184	22	0.258	25	0.276	16	8.62	2
Kansas	0.219	16	0.249	27	0.236	22	2.95	28
Kentucky	0.147	31	0.199	35	0.289	14	4.00	19
Louisiana	0.079	37	0.118	39	0.167	30	4.00	19
Maine	0.294	3	0.364	7	0.454	2	6.50	6
Maryland	0.129	35	0.333	11	0.106	36	2.85	29
Massachusetts	0.170	26	0.243	28	0.120	34	0.00	37
Michigan	0.045	38	0.170	36	0.098	37	0.00	37
Minnesota	0.240	10	0.504	2	0.301	10	2.50	32
Mississippi	0.175	25	0.213	33	0.284	15	2.00	35
Missouri	0.182	23	0.222	29	0.214	24	4.50	15
Montana	0.202	18	0.256	26	0.325	8	9.00	1
Nebraska	0.249	7	0.311	14	0.304	9	4.17	18
New Jersey	0.236	12	0.201	34	0.134	33	4.97	13
New Mexico	0.301	2	0.340	10	0.432	3	6.50	6
New York	0.287	4	0.435	5	0.247	21	2.85	29
North Carolina	0.161	29	0.294	16	0.301	11	2.75	31
North Dakota	0.133	34	0.149	37	0.172	29	3.44	25
Ohio	0.252	6	0.281	19	0.248	20	6.76	5
Oklahoma	0.195	20	0.274	20	0.347	7	6.25	9
Oregon	0.166	27	0.327	12	0.266	18	4.00	19
Pennsylvania	0.000	42	0.122	38	0.053	41	0.00	37
Rhode Island	0.267	5	0.301	15	0.195	27	6.40	8
South Carolina	0.230	13	0.313	13	0.430	4	4.50	15
Utah	0.143	32	0.273	21	0.267	17	4.70	14
Vermont	0.243	9	0.511	1	0.296	13	3.12	26
Virginia	0.141	33	0.217	32	0.143	32	3.75	22
West Virginia	0.189	21	0.272	22	0.351	5	3.50	24
Wisconsin	0.162	28	0.482	4	0.298	12	2.15	34

Notes: States not levying a general individual income tax in 1994 were: Alaska, Florida, Nevada, New Hampshire, South Dakota, Tennessee, Texas, Washington, and Wyoming.

every 1.0 percent change in the state economy, Ohio's state income tax revenue will change by 1.22 percent.¹⁴ Thus, a recession in which state economic activity fell by 3 percent would result in a 3.66 percent reduction in state income tax revenue.

Figure 2 - The Effect of Income Tax Progressivity on State Revenue Variability



4. Policy Options To Reduce Progressivity

There are three basic policy variables affecting the degree of progressivity of an income tax system: rate structure itself, the size of the standard deductions/exemptions, and deductibility of federal income taxes. First, more tax brackets (or a greater spread between the tax rates at the top and bottom) should result in a higher degree of progressivity. Second, larger standard deductions/exemptions normally increase the degree of progressivity of the tax system.¹⁵ Third, deductibility of federal income taxes against state taxable income, which nine states allow, effectively reduces the progressivity of the state income tax.¹⁶

Table 4 reports regression results that relate the degree of progressivity with various aspects of the tax structure. These results confirm that policymakers can adjust the tax code in order to reduce the degree of progressivity. Specifically, to reduce the progressivity of the Ohio income tax, these results suggest that lawmakers can: (1) compress the marginal tax rate structure by reducing the number of brackets or reducing the spread between the top and bottom tax rates; (2) decrease the level of the standard deductions and personal exemptions; and (3) allow taxpayers to deduct federal income tax liability from their Ohio taxable income. From the standpoint of economic growth, however, lowering and compressing tax rates is clearly the preferred reform.

Income Tax Progressivity in Ohio

**Table 4 – How Income Tax Characteristics Relate to Income Tax Progressivity:
Ordinary Least Squares Regression Results**

Dependent Variable: Degree of Progressivity in State's Income Tax

Independent Variable	(1)	(2)
Intercept	0.0165	0.0200
Number of Tax Brackets	0.0016 (2.61**)	
Top Rate Minus Bottom Rate		0.0006 (1.68*)
Married/Joint Standard Deduction (in \$1,000's)	0.0004 (2.91***)	0.0015 (3.53***)
Federal Income Taxes Deductible (1 = yes)	-0.0037 (2.69**)	-0.0089 (2.29**)
R-squared (adjusted)	0.326	0.261
Number of Observations	42	42
Absolute T-statistics in parentheses		
*statistically significant at 90% level		
**statistically significant at 95% level		
*** statistically significant at 99% level		

Notes: These results indicate that reducing the number of tax brackets or reducing the spread between top and bottom tax rates; making federal taxes deductible; and decreasing the standard deduction will reduce the degree of income tax progressivity. The size of the personal exemption was included as an independent variable but was insignificant in all specifications. These regressions use as the measure of progressivity the married couple, 2 wage earner data from the Minnesota tax study.

Note: Variability of state tax revenue is the percentage amount by which state individual income tax revenue will change in response to a 1 percent change in the state economy. Source of Data: Dye and McGuire, 1998.

5. Conclusion

In this paper we have demonstrated that Ohio's state income tax is highly progressive when compared with neighboring states, and is well above average when compared with all other states. This high degree of income tax progressivity results in slower economic growth and more variability in state income tax revenue. By reforming Ohio's income tax to make it less progressive, Ohio could have faster economic growth and more stable tax revenue.

Notes

- ¹ Data for this paragraph are from State Government Finances: 2000, published by the U.S. Census Bureau. They are available at <http://www.census.gov/govs/www/state00.html>.
- ² For more detail about the structure of Ohio Income Tax, see James Damask and Robert Lawson, *Tax Reform for Ohio's New Millennium* (Columbus, OH: The Buckeye Institute, 2001).
- ³ For a classic discussion of the meaning and measurement of progressivity, see R.A. Musgrave and Tun Thin, *Income Tax Progression: 1929-48*, *Journal of Political Economy* 56 (December, 1948): 498-514.
- ⁴ This is to distinguish it from the family's marginal tax rate, which is the percent of an additional dollar of income that the family must pay in taxes. The tax rate typically published by a state showing the rate for each tax bracket is the marginal tax rate. Marginal tax rates are the appropriate ones to use when examining the effect of income taxes on the incentive to earn income, while average tax rates are used to examine the progressivity of an income tax.
- ⁵ If the family paid exactly 10 percent of their income in taxes at both levels of income, the tax would be considered proportional. Many states that have "flat" income taxes have a constant marginal tax rate, but provide an exemption for the first several thousand dollars earned. Because of this exemption, the computed average tax rate still rises with family income and the tax is actually progressive.
- ⁶ See "Comparison of 1994 Individual Income Tax Burdens by State," from the Minnesota Department of Revenue, Tax Research Division, available at <http://www.taxes.state.mn.us/reports/burdens.pdf>.
- ⁷ See *Who Pays? A Distributional Analysis of the Tax Systems in All 50 States* (Washington DC: Citizens for Tax Justice & Institute on Taxation and Economic Policy, June 1996).
- ⁸ This is obtained as the coefficient, β , from a regression performed for each state of the following specification: $ATR = \alpha + \beta \cdot \text{Income Level} + \varepsilon$.
- ⁹ A positive estimate indicates that the tax code is progressive; a negative estimate would indicate that the tax code is regressive; and an estimate of zero would be a proportional tax.
- ¹⁰ Nine states have no income tax on earned income. Fifty-one states (including the District of Columbia) minus 9 equals 42.
- ¹¹ Few studies have looked specifically at the issue of progressivity at the state level. See, William Hunter and Charles Scott, "Interstate Differences in Individual Income Taxes," *Public Finance Quarterly* 14, no. 1 (January 1986): 69-86; and Richard Vedder, "Federal Tax Reform: Lessons from the States," *Cato Journal* 5 (Fall 1985): 571-590. For more on the relationship between overall taxation and economic growth see Richard Vedder, *Grinding to a Halt: Ohio's Tax Policy and its Impact on Economic Growth* (Columbus, OH: The Buckeye Institute, 2002).
- ¹² The draft report suggests, among other things, eliminating the top income tax bracket. Report of the Committee to Study State and Local Taxes (Draft), March 1, 2003.
- ¹³ For those readers interested, the regression fit to the data in the figure has a slope coefficient of -0.066857 with a t-ratio of -3.436. The R-squared was 0.242.
- ¹⁴ Data on state income tax revenue variability are from Richard F. Dye and Therese J. McGuire, *Block Grants and the Sensitivity of State Revenues to Recession*, 1997 Proceedings of the National Tax Association (1998): 15-23. For a more detailed look at the variability of state tax revenue and its effects see Russell S. Sobel and Randall G. Holcombe, "Measuring the Growth and Variability of Tax Bases Over the Business Cycle," *National Tax Journal* 49, no. 4 (December 1996): 535-552, and Randall G. Holcombe and Russell S. Sobel, *Growth and Variability in State Tax Revenue: An Anatomy of State Fiscal Crises* (Westport, CT: Greenwood Press, 1997).
- ¹⁵ Larger standard deductions may not increase progressivity in highly graduated tax structures like Ohio's because such deductions have the effect of reducing the income tax liability of high income taxpayers more than low income taxpayers. Wagstaff and van Doorslaer, for example, examine this issue for OECD nations. Adam Wagstaff and Eddy van Doorslaer, "What Makes the Personal Income Tax Progressive: A Comparative Analysis of Fifteen OECD Countries," *International Tax and Public Finance* 8 (May 2001): 299-315.
- ¹⁶ This happens because the federal income tax liability is much higher for higher income taxpayers.

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