

# *State Business Tax Climate: How Should It Be Measured and How Important Is It?*

States are more concerned than ever before about their business tax climate. Over the past two decades, profound technological and political changes have enhanced employers' geographic mobility and extended their geographic range, thereby intensifying economic competition both within the United States and throughout the world. Yet, while fierce interjurisdictional rivalry is inducing states to cut taxes, demand is rising for state and local services such as education, health care, and law enforcement. Substantial impending reductions in federal aid will compound the states' fiscal dilemma.

Caught between conflicting long-run fiscal pressures, state policymakers have sought advice on how to evaluate their state's tax competitiveness and the relative cost-effectiveness of alternative competitive tactics. The advice that they have received has often been confusing and contradictory. Economists disagree on the best indicators of tax competitiveness and the best models of locational choice. Many state tax regimes are competitive according to some measures but uncompetitive according to others. Some studies find that interstate tax differences significantly influence business location; other studies find just the opposite. Studies analyzing the same tax characteristic draw opposite conclusions about whether it is a significant locational determinant.<sup>1</sup>

This lack of consensus may partially reflect the inaccuracy of the most closely monitored measures of tax competitiveness. With few exceptions, such measures, although easily computed, fail to focus on those tax characteristics that should matter most to profit-maximizing firms. This article attempts to correct this flaw. With an analytic framework used by two Massachusetts tax study commissions (for which the author served as director), it evaluates the tax competitiveness in 1991 of 22 states through the eyes of a rational, profit-maximizing business executive weighing alternative sites for a new facility. All six New England states and most of their principal economic rivals are included in the sample. The article then estimates the impact of interstate differences

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Table 1

*Frequently Cited Indicators of State Tax Competitiveness*

Rank	Highest Statutory Corp. Income Tax Rate as of Sept. 1995 (%)	Rank	State and Local Corp. Income Taxes per \$1000 Personal Income, Fiscal Year 1990 (\$)	Rank	S. & L. Corp. Income Taxes and Property Taxes Paid by Businesses per \$1000 Personal Income, FY 1990 (\$)	
1	Iowa	12	1 Michigan <sup>a</sup>	12.63	1 Wyoming	53.14
<b>2</b>	<b>Connecticut</b>	<b>11.25</b>	2 Kentucky	12.13	2 Montana	47.78
3	North Dakota	10.5	3 West Virginia	9.67	3 Alaska	35.34
4	Pennsylvania	9.99	4 Delaware	9.47	4 New York	31.35
5	Minnesota	9.8	5 New York	9.15	5 Michigan <sup>a</sup>	29.80
6	New York	9.675	6 California	8.51	6 Kansas	27.76
<b>7</b>	<b>Massachusetts</b>	<b>9.5</b>	<b>7 Connecticut</b>	<b>8.50</b>	7 Arizona	24.80
8	Alaska	9.4	8 Montana	7.08	8 West Virginia	24.23
9	California	9.3	9 Louisiana	6.96	<b>9 New Hampshire</b>	<b>22.47</b>
10	Arizona	9	<b>10 Massachusetts</b>	<b>6.64</b>	10 Louisiana	22.34
10	West Virginia	9	11 Minnesota	6.27	11 Texas	21.89
10	New Jersey	9	12 North Carolina	6.13	11 Oregon	21.89
<b>10</b>	<b>Rhode Island</b>	<b>9</b>	13 New Jersey	6.11	<b>13 Connecticut</b>	<b>20.83</b>
<b>14</b>	<b>Maine</b>	<b>8.93</b>	<b>14 New Hampshire</b>	<b>5.64</b>	14 Utah	20.69
15	Ohio	8.9	15 Wisconsin	5.45	15 South Carolina	20.29
16	Delaware	8.7	16 Pennsylvania	5.27	16 Colorado	20.18
17	Wisconsin	8.335	17 Idaho	5.23	17 California	19.87
18	Kentucky	8.25	18 North Dakota	5.22	18 Mississippi	18.81
<b>18</b>	<b>Vermont</b>	<b>8.25</b>	19 Kansas	5.08	19 Indiana	18.78
20	Louisiana	8	20 Ohio	4.69	20 Minnesota	18.72
20	Idaho	8	21 Georgia	4.63	21 Kentucky	18.63
<b>20</b>	<b>New Hampshire</b>	<b>8</b>	22 Hawaii	4.61	22 Illinois	18.46
23	Indiana	7.9	23 Tennessee	4.57	<b>23 Maine</b>	<b>18.36</b>
24	Nebraska	7.81	24 Iowa	4.54	24 New Jersey	18.20
25	North Carolina	7.75	25 Illinois	4.28	25 Ohio	18.20
26	New Mexico	7.6	26 Utah	4.22	26 Georgia	16.98
27	Kansas	7.375	27 Arkansas	4.20	27 North Carolina	16.65
28	Illinois	7.3	28 Mississippi	3.90	28 Idaho	16.26
29	Montana	7.25	29 Indiana	3.86	<b>29 Vermont</b>	<b>16.20</b>
30	Maryland	7	<b>30 Rhode Island</b>	<b>3.84</b>	30 Florida	15.47
31	Oregon	6.6	31 Oregon	3.29	<b>31 Massachusetts</b>	<b>15.17</b>
32	Arkansas	6.5	32 Alabama	3.20	32 Wisconsin	14.75
33	Hawaii	6.4	32 Arizona	3.20	33 Delaware	14.50
34	Missouri	6.25	34 South Carolina	3.15	<b>34 Rhode Island</b>	<b>14.47</b>
35	Virginia	6	35 South Dakota	3.14	35 Iowa	14.37
35	Georgia	6	36 Florida	3.13	36 Tennessee	14.22
35	Oklahoma	6	37 New Mexico	3.07	37 Nebraska	14.20
35	Tennessee	6	38 Maryland	2.97	38 Missouri	14.07
39	Florida	5.5	<b>39 Vermont</b>	<b>2.92</b>	39 Virginia	13.24
40	Colorado	5	<b>40 Maine</b>	<b>2.90</b>	40 North Dakota	12.82
40	Alabama	5	41 Nebraska	2.89	41 Pennsylvania	12.66
40	Mississippi	5	42 Virginia	2.65	42 Maryland	12.59
40	South Carolina	5	43 Missouri	2.63	43 Arkansas	11.45
40	Utah	5	44 Colorado	2.12	44 Oklahoma	11.38
45	Texas	n.a.	45 Oklahoma	2.10	45 South Dakota	10.68
45	South Dakota	n.a.	46 Alaska	1.62	46 Washington	10.40
45	Nevada	n.a.	47 Washington	0	47 Hawaii	10.30
45	Washington	n.a.	47 Texas	0	48 Nevada	10.26
45	Wyoming	n.a.	47 Wyoming	0	49 New Mexico	9.49
45	Michigan	n.a.	47 Nevada	0	50 Alabama	9.24

<sup>a</sup> The U.S. Bureau of the Census treats Michigan's Single Business Tax as an income tax, even though it is really a form of value-added tax.

n.a. = not applicable.

Source: Author's calculations; Commerce Clearing House, *State Tax Guides*; U.S. Bureau of the Census, *State Government Finances—1992*; Tannerwald (1993, Appendix D-1, Table A-2).

in tax competitiveness on the geographic allocation of manufacturers' capital spending.

The article finds that business tax climate exerts only a small, highly uncertain effect on capital spending. States may be more likely to stimulate their economy by enhancing public services valued by businesses. These findings are consistent with those of the most recent studies examining the impact of state and local tax characteristics on economic performance (summarized in Lynch 1995).

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*States may be more likely to stimulate their economy by enhancing public services valued by business than by altering their business tax climate.*

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For 1991, the article finds considerable disparity among the New England states in business tax competitiveness. New Hampshire and Massachusetts had the best business tax climates in the region, ranking sixth and ninth, respectively, in the 22-state sample. Rhode Island's and Maine's business tax climates were average, while those of Connecticut and Vermont were relatively unattractive.

### *I. A Little Background*

Previous studies (Pomp 1987; Tannenwald 1987, 1993, 1994) have set forth the attributes of a good indicator of tax competitiveness and critiqued many indicators frequently cited in public debate. A brief summary of this critique is provided here.

Since businesses are primarily interested in making profits, indicators of tax competitiveness should focus on those taxes that most directly affect a firm's bottom line. They should also measure such taxes' impact on the profitability of marginal business investment projects. Businesses rarely move their entire operations from one site to another just to lower their taxes. When deciding where to locate a marginal facility, however, like a new plant, taxes are more likely to be a factor.

Measures of tax competitiveness should evaluate the tax burden that a marginal facility will bear over its entire lifetime, not just during the first years of its existence. They should take into account taxes paid to all levels of government and how these taxes interact to affect a firm's rate of profit. For example, they should take into account the deductibility of taxes paid by a firm to one state from its taxable income in another state, as well as the deductibility of state and local taxes from federal taxable income. Firms do not care to whom they pay taxes; they care how much total tax they pay relative to the profits they earn.

The most frequently used indicators of state tax competitiveness generally lack these qualities. Consider, for example, three indicators cited in recent debate over business tax policy in Massachusetts: 1) the statutory corporate income tax rate, 2) state and local corporate income taxes as a percentage of statewide personal income, and 3) the sum of state and local taxes on corporate income and nonresidential property as a percentage of statewide personal income.<sup>2</sup> The 50 states are ranked according to each of these statistics in Table 1.

The statutory tax rate on corporate income (col. 1) fails to take into account most taxes and fees paid by businesses, such as taxes on net worth, property, payroll, and purchases of intermediate inputs. The income tax rate also fails to take into account differences across states in the definition of taxable corporate income. Some states with a high statutory rate define taxable profits narrowly, allowing relatively generous deductions and exclusions. Others permit corporations to use favorable apportionment formulas or claim generous credits against tax.

Like the statutory corporate income tax rate, the measure of corporate income tax collections as a percentage of personal income (col. 2) focuses on only a small portion (about one-tenth) of state and local taxes paid by businesses (Tannenwald 1993, Appendix Table D-2). In addition, it bears little, if any, relation to the ratio of business taxes paid to profits earned. In recent years, corporations have boosted profits by cutting costs, including payroll. Wage cuts and layoffs depress personal income. Under such conditions, corporate taxes as a percentage of personal income could

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<sup>1</sup> For recent surveys of the literature on the impact of interstate tax differentials on economic growth, see Bartik (1991), Wasylenko (1991), Tannenwald (1993), and Lynch (1995).

<sup>2</sup> See Lester, Bernard, Levy, and Tripathi (1995); Massachusetts Taxpayers Foundation (1995); and DRI/McGraw Hill (1995).

be high, even if corporate taxes as a percentage of profits is average or low.<sup>3</sup>

The last indicator (col. 3), unlike the other two, takes into account property taxes paid by businesses (both incorporated and unincorporated). This is a significant improvement, given that property taxes account for the largest fraction (approximately one-fourth) of all state and local business taxes in the United States (Tannenwald 1993, Appendix Table D-2). Taking into account nonresidential property taxes dramatically changes the ranking of some states.

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For example, in columns 1 and 2, Massachusetts ranks 7th and 10th in the nation, respectively, in business tax burden. In column 3, the Commonwealth ranks 31st.<sup>4</sup>

## *II. The Representative Firm Approach to Evaluating Business Tax Climate*

Given the difficulty of evaluating states' business tax climate with available data, some economists have explored an alternative strategy—the "representative firm" approach.<sup>5</sup>

### *How the Approach Works*

Hypothetical firms representative of selected industries are assumed to be located at a variety of sites around the nation. It is assumed that the firms' pre-tax rate of return, asset mix, capital/labor ratio, and non-tax costs are identical at all sites. The only differences across sites, therefore, are state and local tax characteristics. At every site, each firm's local, state, and federal tax liabilities and net after-tax cash flow are computed some years into the future, typically between 20 and 60 years. The analysis is not limited to taxes on corporate profits and net worth. Property

taxes and, in some cases, sales taxes and unemployment insurance taxes are also taken into account.

It is then assumed that each firm builds a new facility at each site, including the firm's current site. This expansion requires the firm to invest in new equipment, structures, inventories, and financial assets and to hire more workers. As a result of the expansion, each firm makes more profits and pays more taxes. By comparing after-tax cash flows before and after expansion, one can calculate the long-run, after-tax rate of return (AFTAX) to the new facility at each site for each firm.<sup>6</sup>

### *Previous Results Generated by the Representative Firm Approach*

The Commonwealth of Massachusetts used this approach to evaluate its business tax climate in 1986 and 1993. The 1986 study (Commonwealth of Massachusetts 1987) was undertaken by the Massachusetts Special Commission on Tax Reform. The 1993 study (Tannenwald 1993) was commissioned by the Massachusetts Special Commission on Business Tax Policy, chaired by Richard Syron, then president of the Federal Reserve Bank of Boston. The author served as director for both commissions. Both evaluations compared the after-tax rate of return to marginal business investment at five Massachusetts sites, 10 sites in rival states, and a fictitious site at which no state or local taxes are imposed ("Empty Site"). The evaluations were conducted for five hypothetical firms, each representative of a different manufacturing industry with a significant presence in Massachusetts. In both studies, the five industries were men's and boys' clothing, fabricated metals, computers, electronics, and scien-

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<sup>3</sup> For example, over the course of 1992 nationwide personal income grew by 8 percent, while corporate profits grew by 22 percent. Over the course of 1993 the rate of growth in personal income slowed to 2.8 percent, while corporate profits again expanded by 22 percent. From 1985 through 1994, the annual rate of growth in personal income was negatively correlated with the annual growth rate in corporate profits.

<sup>4</sup> However, the denominator of the ratio, personal income, is still irrelevant to the measurement of business tax burden. Furthermore, as noted above, most states do not break down their property tax collections into residential and nonresidential components. Consequently, business property taxes by state must be estimated.

<sup>5</sup> Studies utilizing this approach include S. H. Brooks Co., Inc. (1993); Commonwealth of Massachusetts (1987); L. Papke (1987, 1991); Papke and Papke (1984, 1986); Connecticut Task Force on State Tax Revenue (1991); KPMG Peat Marwick (1994); and DeSeve and Vasquez (1977).

<sup>6</sup> A complete explanation of the method and its use in this study is provided in a detailed methodological appendix, available from the author on request.

Table 2

*Indicators of Business Tax Competitiveness for Selected Manufacturing Industries (AFTAX), 1993 and 1986*

Site	(1) 5-Industry Average				(2) Men's and Boys' Clothing				(3) Fabricated Metals			
	1993	Rank	1986	Rank	1993	Rank	1986	Rank	1993	Rank	1986	Rank
"Empty Site"	18.9	1	16.4	1	18.6	1	15.4	1	19.0	1	17.0	1
El Paso, TX	18.2	2	15.7	2	17.5	2	14.7	2	18.4	2	16.3	2
Hagerstown, MD	17.7	3	15.1	3	16.9	3	14.1	4	18.0	3	15.8	3
Poughkeepsie, NY	17.6	4	15.1	3	16.7	4	14.0	7	17.9	4	15.7	5
<b>Chelmsford, MA</b>	<b>17.5</b>	<b>5</b>	<b>15.0</b>	<b>8</b>	<b>16.6</b>	<b>7</b>	<b>14.0</b>	<b>7</b>	<b>17.7</b>	<b>5</b>	<b>15.6</b>	<b>8</b>
<b>Foxboro, MA</b>	<b>17.4</b>	<b>6</b>	<b>15.0</b>	<b>8</b>	<b>16.5</b>	<b>8</b>	<b>14.0</b>	<b>7</b>	<b>17.6</b>	<b>6</b>	<b>15.6</b>	<b>8</b>
<b>Greenfield, MA</b>	<b>17.4</b>	<b>6</b>	<b>15.0</b>	<b>8</b>	<b>16.5</b>	<b>8</b>	<b>14.0</b>	<b>7</b>	<b>17.6</b>	<b>6</b>	<b>15.6</b>	<b>8</b>
<b>Bedford, MA</b>	<b>17.3</b>	<b>8</b>	<b>15.0</b>	<b>8</b>	<b>16.4</b>	<b>12</b>	<b>14.0</b>	<b>7</b>	<b>17.5</b>	<b>8</b>	<b>15.6</b>	<b>8</b>
Rockford, IL	17.3	9	15.0	8	16.5	8	13.9	13	17.5	8	15.6	8
Memphis, TN	17.3	9	15.1	3	16.7	4	14.1	4	17.4	10	15.7	5
<b>Nashua, NH</b>	<b>17.2</b>	<b>11</b>	<b>15.1</b>	<b>3</b>	<b>16.7</b>	<b>4</b>	<b>14.2</b>	<b>3</b>	<b>17.4</b>	<b>10</b>	<b>15.7</b>	<b>5</b>
<b>Waltham, MA</b>	<b>17.2</b>	<b>11</b>	<b>14.9</b>	<b>14</b>	<b>16.3</b>	<b>15</b>	<b>13.9</b>	<b>13</b>	<b>17.4</b>	<b>10</b>	<b>15.5</b>	<b>14</b>
Los Angeles, CA	17.1	13	14.9	14	16.5	8	13.8	15	17.3	13	15.5	14
<b>Stamford, CT</b>	<b>17.0</b>	<b>14</b>	<b>15.0</b>	<b>8</b>	<b>16.4</b>	<b>12</b>	<b>14.0</b>	<b>7</b>	<b>17.2</b>	<b>14</b>	<b>15.6</b>	<b>8</b>
Greenville, NC	17.0	14	15.1	3	16.4	12	14.1	4	17.2	14	15.8	3
Bala Cynwyd, PA <sup>a</sup>	16.5	16	14.8	16	15.8	16	13.7	16	16.7	16	15.4	16

  

Site	(4) Computers				(5) Electronic Components				(6) Scientific Instruments			
	1993	Rank	1986	Rank	1993	Rank	1986	Rank	1993	Rank	1986	Rank
"Empty Site"	19.2	1	16.8	1	18.9	1	16.4	1	18.8	1	16.2	1
El Paso, TX	18.5	2	16.1	2	18.4	2	15.8	2	18.0	2	15.5	2
Hagerstown, MD	18.1	3	15.6	3	17.9	3	15.3	3	17.7	3	14.9	3
Poughkeepsie, NY	18.0	4	15.5	5	17.8	4	15.3	3	17.5	4	14.8	5
<b>Chelmsford, MA</b>	<b>17.9</b>	<b>5</b>	<b>15.4</b>	<b>8</b>	<b>17.7</b>	<b>5</b>	<b>15.1</b>	<b>9</b>	<b>17.4</b>	<b>5</b>	<b>14.8</b>	<b>5</b>
<b>Foxboro, MA</b>	<b>17.8</b>	<b>6</b>	<b>15.4</b>	<b>8</b>	<b>17.7</b>	<b>5</b>	<b>15.1</b>	<b>9</b>	<b>17.4</b>	<b>5</b>	<b>14.8</b>	<b>5</b>
<b>Greenfield, MA</b>	<b>17.8</b>	<b>6</b>	<b>15.4</b>	<b>8</b>	<b>17.6</b>	<b>7</b>	<b>15.1</b>	<b>9</b>	<b>17.3</b>	<b>7</b>	<b>14.7</b>	<b>11</b>
<b>Bedford, MA</b>	<b>17.7</b>	<b>8</b>	<b>15.4</b>	<b>8</b>	<b>17.6</b>	<b>7</b>	<b>15.1</b>	<b>9</b>	<b>17.2</b>	<b>8</b>	<b>14.8</b>	<b>5</b>
Rockford, IL	17.6	9	15.4	8	17.6	7	15.2	6	17.2	8	14.7	11
Memphis, TN	17.6	9	15.5	5	17.5	10	15.2	6	17.2	8	14.8	5
<b>Nashua, NH</b>	<b>17.5</b>	<b>12</b>	<b>15.5</b>	<b>5</b>	<b>17.4</b>	<b>12</b>	<b>15.2</b>	<b>6</b>	<b>17.1</b>	<b>11</b>	<b>14.8</b>	<b>5</b>
<b>Waltham, MA</b>	<b>17.6</b>	<b>9</b>	<b>15.3</b>	<b>14</b>	<b>17.5</b>	<b>10</b>	<b>15.1</b>	<b>9</b>	<b>17.1</b>	<b>11</b>	<b>14.7</b>	<b>11</b>
Los Angeles, CA	17.4	13	15.3	14	17.3	13	15.0	15	17.1	11	14.7	11
<b>Stamford, CT</b>	<b>17.3</b>	<b>14</b>	<b>15.4</b>	<b>8</b>	<b>17.2</b>	<b>14</b>	<b>15.1</b>	<b>9</b>	<b>16.9</b>	<b>14</b>	<b>14.7</b>	<b>11</b>
Greenville, NC	17.2	15	15.6	3	17.2	14	15.3	3	16.9	14	14.9	3
Bala Cynwyd, PA <sup>a</sup>	16.8	16	15.2	16	16.8	16	15.0	15	16.5	16	14.6	16

<sup>a</sup>Replaced by Lancaster, PA in the 1993 sample.

Note: See text and detailed technical appendix (available from author on request) for methodological details.

Source: Commonwealth of Massachusetts (1987); and S. H. Brooks Co., Inc. (1993).

tific instruments. With one exception, the sites used in both studies were also identical. Two of the sites outside of Massachusetts were also located in New England states: Stamford, CT and Nashua, NH.<sup>7</sup> The business taxes taken into account in the studies were taxes on profits, capital stock, net worth, and real estate, and unemployment compensation taxes.

One set of indicators of business tax climate generated by both studies is shown in Table 2. The

hypothetical firms used in computing this set were prototypical "export-oriented" firms, those that con-

<sup>7</sup> In 1993, Lancaster, PA replaced Bala Cynwyd, PA because in 1993 the latter town was no longer a distinct, taxing jurisdiction.

The hypothetical investment undertaken by each representative firm was assumed to have a 60-year useful lifetime and to earn a pre-tax rate of return on working assets of 25 percent. Working assets consist of land, structures, equipment, cash, and inventories. An inflation rate of 0 percent was assumed. Within an industry,

centrate their facilities in one or two locations and sell most of their goods in either nationwide or international markets. Before expansion, each firm was assumed to produce solely at its home site and to sell 90 percent of its product in other states.

Each row in the table summarizes the results of a set of simulations in which each of the cities was assumed to be considered both a headquarters site and a potential site for expansion. For example, firms headquartered in Rockford, IL, evaluate Nashua, NH as potential expansion site. Then firms headquartered in Stamford, CT; Los Angeles, CA; Poughkeepsie, NY;

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*Local property taxes vary widely within a state, making it difficult to draw conclusions about a state's overall business tax climate from the tax burden imposed at only one site.*

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and each of the other sites (including Nashua) also evaluate Nashua as a potential expansion site. As a result, for each industry-specific firm, 16 after-tax rates of return (AFTAXs) were calculated at each expansion site, one for each possible pre-expansion site. A 16-by-16 matrix of AFTAXs was thereby generated.

Each entry in sections 2 through 6 of Table 2 represents the mean of the 16 AFTAXs computed at the expansion site for each of the five industry-specific hypothetical firms. For example, in section 2 the 1993 value for "Empty Site" (18.6) is the average of the 16 AFTAXs computed for the hypothetical manufacturer of men's and boys' clothing, assuming that "Empty Site" is the sole expansion site and each of the 16 cities is an alternative headquarters site. The higher the AFTAX, the lower the tax burden on the new facility. Section 1, which provides the average for each site of the five AFTAXs reported in sections 2 through 6, is a summary measure of tax competitiveness.

The AFTAXs for 1993 were all higher than their 1986 counterparts because in 1987 the statutory federal tax rate on corporate income was reduced from 46 percent to 34 percent. In 1993, the dispersion in

AFTAX across sites for a given industry was larger than in 1986 because, after the Federal Tax Reform Act of 1986, state and local taxes became a larger component of businesses' total tax liability.<sup>8</sup> At each site in each year, differences across industries in AFTAX reflect primarily differences in labor intensity. For example, the AFTAXs of the representative manufacturer of men's and boys' apparel are low because the industry is relatively labor-intensive. As a result, the firm's unemployment insurance taxes are high, and the benefits of capital-oriented tax incentives, such as investment tax credits, are relatively low.

In 1986, the AFTAXs at the seven New England sites were virtually identical and near the median. In 1993, Chelmsford, MA ranked 5th, Foxboro, MA and Greenfield, MA tied for 6th, Nashua, NH fell into a tie with Waltham, MA for 11th, and Stamford, CT slumped to a tie for 14th, trailed only by Lancaster, PA. Sites whose competitive standing changed markedly between the two years experienced large changes in property tax burden. Property tax burdens in Chelmsford, Foxboro, and Greenfield fell sharply, while those in Stamford and Nashua rose. The competitiveness of the Massachusetts sites also benefited from a tripling of the Commonwealth's investment tax credit in 1993. Even in 1993, however, differences among the New England sites in AFTAX were small.

#### *Criticisms of the Analysis of Tax Competitiveness Performed by the Two Massachusetts Tax Study Commissions*

The methodology used to obtain the results displayed in Table 2 is vulnerable to at least three criticisms: 1) the sample is small and biased, 2) important business tax features are not taken into account, and 3) the atypical geographic characteristics of the hypothetical firms trigger burdensome tax rules that do not apply to most businesses.

*Small, biased sample.* Three New England states—Maine, Rhode Island, and Vermont—are not represented in the sample. Nor are several of New England's other economic rivals, such as Alabama, Florida, Georgia, New Jersey, and South Carolina. Moreover, a majority of the sites in the sample are located in states that impose a relatively high statutory tax rate on corporate income.<sup>9</sup> As a result, the

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<sup>8</sup> Recall that, by assumption, state and local taxation is the only source of difference across sites in each representative firm's AFTAX.

<sup>9</sup> In 1993, the average marginal statutory corporate income tax

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differences across sites in AFTAX were found to be insensitive to the inflation assumption.

sample allegedly makes the AFTAXs at the three New England sites look higher than they really are relative to those at rival locations.<sup>10</sup>

The representativeness and accuracy of the property taxes modeled in the analysis are also open to question. Local property taxes vary widely within a state, making it difficult to draw conclusions about a state's overall business tax climate from the tax burden imposed at only one site located within its borders.<sup>11</sup> The analysis also assumes that only land and structures are subject to property taxation, even though many states permit their cities and towns to tax personal property, inventories, and even intangible property. As will be shown in the next section, failure to include these types of assets in the general property tax base creates significant measurement error.

*Omission of important business taxes.* The analysis fails to take into account, among other tax features, differences across sites in license taxes, fees and charges, sales taxes on purchases of intermediate goods, and tax credits designed to subsidize such narrowly defined expenses as training, research and development, pollution control, the provision of day care, and the wages of workers from disadvantaged backgrounds. These features are not taken into account because the data needed to do so are not readily available. Their omission biases the results against states with relatively low sales taxes on purchases of intermediate goods and generous, narrowly defined tax credits.

The potential bias from these omissions is evident from a study conducted in 1994 by KPMG Peat Marwick designed to evaluate the tax competitiveness of 10 states and two Canadian provinces (KPMG Peat Marwick 1994). The study, which used the representative firm approach, took into account sales taxes on business purchases and research and development

tax credits. It found that Massachusetts had the second most attractive business tax climate among the 10 U.S. states examined. KPMG Peat Marwick attributed the Commonwealth's competitiveness to the fact that it has "kept all three of the major state-local business taxes—corporate income, property, and sales—in line with competitor states."<sup>12</sup> A similar study conducted by KPMG Peat Marwick for the state of North Carolina (Vlaisavljevich and Pollock 1995), which compared the marginal business tax burdens of 21 states, also found the Massachusetts business tax structure to be relatively attractive.

*Atypical geographic allocation of payroll, property, and sales.* Corporations with customers in several states typically have facilities located in most of those states, such as branch plants, warehouses, sales offices, and service centers. By contrast, the hypothetical firms used in the analysis locate all of their facilities and employees in one or two states but realize most of their sales elsewhere. In some states, firms with such uncommon geographic characteristics bear unusually heavy tax burdens that are not faced by typical multistate firms. Consequently, these assumed characteristics may bias the results of the analysis.

These special tax burdens arise from certain states' attempts to ensure that most of the nationwide income earned by their multistate corporate taxpayers is taxed by some state. These states identify which of their corporate taxpayers have generated out-of-state income that has escaped taxation by any state. They then determine the reason why this income has escaped taxation. There are two possible reasons. First, the state in which the income was earned does not tax corporate income. (Texas is the only state in the tax study commissions' sample that does not.) Second, the corporation lacks a physical presence within the state. Federal law prohibits a state from taxing the income of a producer or distributor of goods that has no physical presence (facilities or employees) within its territory, even if the firm sells goods to customers located there.<sup>13</sup> For example, Massachusetts may not tax any of the income earned by a manufacturer of scientific instruments that lacks property or employees in the Commonwealth, even if the manufacturer sells millions of dollars' worth of goods

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rate for all 50 states and the District of Columbia was 7.09. The average for the 11-state sample was 8.32 (U.S. Advisory Commission on Intergovernmental Relations 1994).

<sup>10</sup> This allegation was made by Michael Widmer, President of the Massachusetts Taxpayers Foundation, in a letter, dated September 8, 1995, to The Honorable James Brett, House Co-Chair of the Joint Committee on Taxation of the Massachusetts legislature.

As noted in Section I, states with high statutory tax rates on corporate income do not necessarily impose high corporate income tax burdens. Many offset their high rates with investment and employment tax credits. Moreover, several states with low corporate income tax rates, or no tax on corporate income, impose alternative business taxes not found in most other states. Two prime examples are Washington's business occupation tax and Texas's net worth tax.

<sup>11</sup> On the other hand, statewide estimates of average business property tax burden are not available for many states.

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<sup>12</sup> However, the KPMG Peat Marwick study did not take into account unemployment insurance taxes, which are relatively high in Massachusetts.

<sup>13</sup> U.S. P.L. 86-272. The law does not extend the same protection to providers of services.

### The Troublesome Issue of Throwback in Modeling State and Local Corporate Income Taxes

Every state that taxes corporate income uses a formula to determine its fair share of the taxable income of a multistate corporation. In most states, the formula is based on the state's shares of the firm's total payroll, property, and sales. (These three variables are usually referred to as "apportionment factors.") For example, Vermont's formula is

Taxable income =

$$\frac{\text{payroll}_{VT}}{\text{payroll}_{TOTAL}} + \frac{\text{property}_{VT}}{\text{property}_{TOTAL}} + \frac{\text{sales}_{VT}}{\text{sales}_{TOTAL}}$$

3

Massachusetts now double-weights sales in order to lighten the tax on firms that produce most of their goods in-state but sell them elsewhere:

Taxable income<sub>MA</sub> =

$$\frac{\text{payroll}_{MA}}{\text{payroll}_{TOTAL}} + \frac{\text{property}_{MA}}{\text{property}_{TOTAL}} + \frac{2 \times \text{sales}_{MA}}{\text{sales}_{TOTAL}}$$

4

In 1995 the Commonwealth changed its apportionment formula for manufacturers to one based exclusively on sales. This change is effective immediately for defense contractors and will be phased in over several years for other manufacturers (*General Laws of Massachusetts 1995*, Chapter 281).

As an illustration of Vermont's formula, consider the scenario in which one of the hypothetical firms used in the analysis is headquartered in Vermont and also expands within Vermont. By assumption, 10 percent of the firm's sales and 100 percent of its payroll and property are sited in-state. According to the state's apportionment formula, 0.70 of the firm's total taxable income [(1.0 + 1.0 + 0.10)/3] is taxable in Vermont. The other 0.30 of taxable income is allocated among the states where the firm has customers but no property or payroll. If the firm were based in Massachusetts and expanded

within the Commonwealth, then 0.55 [(1.0 + 1.0 + 2 × 0.10)/4] of the firm's income would be taxable by the Commonwealth and 0.45 apportioned to other states.

Under Massachusetts' throwback rule, the firm's sales realized in other states would be sited for tax purposes in the Commonwealth and double-weighted. As a result, throwback would raise the fraction of the firm's nationwide income taxable in Massachusetts from 0.55 to 1.0 [(1.0 + 1.0 + 2 × 1.0)/4 = 1.0]. If, like Vermont, Massachusetts only single-weighted sales, throwback would raise this fraction from 0.70 to 1.0 [(1.0 + 1.0 + 1.0)/3 = 1.0]. Throwback has especially dramatic tax effects in states that both have throwback requirements and weight sales disproportionately. Two states represented in the 1986 and 1993 sample, Massachusetts and Illinois, fit this description.

These examples illustrate how the assumed geographic dispersion of the hypothetical firms' apportionment factors, in combination with throwback requirements, exaggerates differences in business tax burdens among states. Yet, if the hypothetical firms had payroll and property in most or all of the states in which they did business (a more typical pattern), the results of the simulations would be difficult to interpret. The computed AFTAXs would reflect a complicated amalgam of the tax burdens at all the sites where the firm were taxable. The impact of differences across sites in tax burdens would be obscured.

The two Massachusetts tax study commissions resolved this dilemma by assuming in their baseline scenarios that throwback provisions are inoperative in all states. The assumption can be further justified by the relative ease with which many throwback provisions can, and are, avoided. For example, a Massachusetts-based corporation can avoid Massachusetts' throwback rules by billing customers from an office, no matter how small, located in a state that does not practice throwback.<sup>14</sup>

to the Commonwealth's businesses and residents every year.

If any of the corporation's out-of-state income has

<sup>14</sup> Massachusetts' throwback provisions are easier to avoid than those of other states. In order to avoid other states' throwback rules, a company must *ship* goods from a point located outside of the state to customers located in states where the company has no

escaped taxation for lack of a physical presence, some states will tax this income themselves, even though it was earned outside of their territory. For example,

payroll or property. In Massachusetts, the company need only *bill* sales to such customers from a point located outside the Commonwealth.



consider a Massachusetts-based corporation that ships products from a Massachusetts facility to customers in Connecticut. If Connecticut does not tax the income realized on these sales, Massachusetts will. This practice is known as "throwback" because the income is "thrown back" to and taxed by a state other than the one in which the income is earned.

By assumption, the income earned by the hypothetical firms in the analysis is taxable only at their home and expansion sites. Yet 90 percent of their sales are realized in states where their income is not taxable. Consequently, the firms' corporate income tax burdens are unusually high when they are based or expand in a state that imposes throwback requirements. Five of the 11 states represented in the 1986 and 1993 samples practice some form of throwback.

Thus, the unusual geographic allocation of the hypothetical firms' payroll, property, and sales has significant tax consequences not experienced by the typical firm that vary dramatically across states depending on whether they practice throwback. The resulting biases, and the manner in which the two Massachusetts' Tax Commissions dealt with them, are discussed in the box.

### *New Results for 1991*

Mindful of the criticisms outlined above, the author modified the earlier approach to evaluate the business tax climates of 22 states in 1991. The same five industries examined by the two tax study commissions were used in the analysis. The year 1991 was chosen because the author wanted to investigate the impact of business tax climate on levels of business fixed investment. In order to perform such an analysis, one must control for factors other than taxation that affect the location of business fixed investment, such as wages, energy costs, the quality of public services, and labor productivity. Values for many of these non-tax factors are not available for years later than 1991.

*Differences between the 1991 analysis and commission studies.* Unlike the studies of the tax reform commissions, the 1991 analysis 1) makes the more realistic assumption that the hypothetical firms have some property and/or employees operating in all the states in which they do business (and, therefore, are not subject to throwback); 2) takes into account differences across states in the general property tax treatment of inventories, machinery and equipment, and intangible property; and 3) compares the marginal tax burdens of states rather than particular cities, in order to provide

an indicator of states' "overall" manufacturing tax climate. This statewide focus required a measure of a state's average property tax burden. Details on the differences between the 1991 analysis and the commission studies are provided in Table 3 and in a detailed appendix, available from the author on request.

*Criteria used in selecting sample of states.* The following partially conflicting criteria were used in determining whether a given state should be included in the sample. 1) Is the state represented in the tax commissions' sample? 2) Is the state in New England? 3) If not in New England, is the state widely considered to be an economic rival of New England states? 4) Can an estimate of statewide property tax burden be obtained from the state's revenue officials or from U.S. Census Bureau data? 5) Is at least one of the five industries analyzed in the tax commissions' studies an important component of its manufacturing sector? and 6) Does the state have a relatively low statutory tax rate on corporate income? (to counter criticism that the commissions' samples were dominated by states with high tax rates).<sup>15</sup>

*Results.* The industry-specific average AFTAXs for the selected states are presented in Table 4, patterned after Table 2. The AFTAXs for each industry were lower in 1991 than in 1993 primarily because in the 1991 analysis local property tax bases are more broadly defined and all firms are subject to income taxation in every state in which they do business (except Washington or Texas, neither of which taxes corporate income).<sup>16</sup>

According to the 1991 analysis, the five states with the most attractive business tax climate were Alabama, Maryland, South Carolina, Florida, and New York. (As noted above, sites in Maryland and New York, the two also in the "original eleven," had relatively attractive business tax climates in the 1986 and 1993 analyses as well.) Alabama headed the list in part because it is the only state in the sample that allows its corporations to deduct their federal tax

<sup>15</sup> The 11 states included in the sample other than the "original 11" had an average marginal statutory income tax rate of 7.03 in 1983, 0.06 percentage point below the national average. These newly added states included those with some of the lowest statutory corporate income tax rates in the nation.

<sup>16</sup> By contrast, in the 1993 analysis firms are taxable only in states where they have payroll or property, and throwback provisions are assumed to be inoperative. As explained in the box, a significant portion of their income therefore escapes state taxation.

The absence in the 1991 sample of a fictitious firm with no state and local taxes also raised average AFTAXs relative to those computed in the 1993 analysis.

Table 3

*Key Differences in Methodology Between Massachusetts Special Commissions' Analyses and 1991 Analysis of Tax Competitiveness*

	Massachusetts Special Commissions' Analyses	1991 Analysis
State and local taxes modeled	<ul style="list-style-type: none"> <li>• State taxes on corporate profits, capital stock, net worth, and gross receipts</li> <li>• State unemployment insurance taxes</li> <li>• State and local taxes on real estate</li> </ul>	<ul style="list-style-type: none"> <li>• State taxes on corporate profits, capital stock, net worth, and gross receipts</li> <li>• State unemployment insurance taxes</li> <li>• State and local taxes on all property, including real estate, inventories, and both tangible and intangible personal property</li> </ul>
Measure of property tax burden	Property tax on land and structures as a percentage of value of land and structures of hypothetical firms, as estimated by assessor's office in each city	Property tax collections as a percentage of the fair market value of statewide taxable property, reported by state officials or the U.S. Census Bureau
Percentage of each apportionment factor in home state in pre-expansion phase	<ul style="list-style-type: none"> <li>• 100 percent of property</li> <li>• 100 percent of payroll</li> <li>• 10 percent of sales</li> </ul>	<ul style="list-style-type: none"> <li>• 90 percent of property</li> <li>• 90 percent of payroll</li> <li>• 10 percent of sales</li> </ul>
Treatment of throwback requirements	Assumed to be avoided	Not applicable because hypothetical firms are assumed to be taxable in every state in which they do business

See methodological appendix for further details, available from author on request.

payments from state taxable income.<sup>17</sup> All five states imposed relatively low average property taxes and unemployment insurance taxes. None had separate taxes on net worth, capital stock, or intangible property that applied to the firms.<sup>18</sup> All but New York also had relatively low average corporate income taxes. Although New York's average corporate income tax burden was somewhat high, the state's generous investment tax credit significantly lowered its marginal income tax burden, thereby boosting its AFTAXs.

According to the 1991 analysis, the three states with the least attractive business tax climate were Connecticut, Pennsylvania, and Washington. (Sites in Connecticut and Pennsylvania, also represented in the "original eleven," fared poorly in the 1993 rankings as well.) Connecticut and Pennsylvania had the

highest 1991 average income tax burdens among the 22 states. Connecticut also suffered from higher-than-average property taxes, while Pennsylvania's competitive standing was adversely affected by its high unemployment insurance taxes. Washington's lack of tax competitiveness, even though it had no corporate income tax, was attributable to its unique gross receipts tax and high unemployment insurance tax.<sup>19</sup>

Among the New England states, New Hampshire and Massachusetts generally had the highest AFTAXs in 1991, followed, in order of decreasing tax competitiveness, by Maine, Rhode Island, Vermont, and Connecticut. In most industries, Massachusetts and New Hampshire ranked among the top third within the whole sample. As in 1993, Massachusetts' most

<sup>17</sup> Modeling this deduction required the construction of an iterative loop because state income taxes are deductible from federal taxable income. The methodological details are provided in a detailed appendix, available from the author on request.

<sup>18</sup> New York imposes a net worth tax, but corporations pay it as an alternative to the income tax. They pay the net worth tax if their net worth tax liability exceeds their income tax liability.

<sup>19</sup> For manufacturing firms based in Washington, the base of this tax consists of the firm's gross receipts from the sale of all products wherever sold. In the analysis, hypothetical firms based in Washington therefore pay tax on 100 percent of their gross receipts, including those from the sale of products manufactured at the expansion site. Firms based in another state pay the tax on gross receipts earned from sales to customers located in Washington (*Laws of Washington*, Section 82.04).

Table 4

*Indicators of Business Tax Competitiveness for Selected Manufacturing Industries (AFTAX), 1991*

State	(1)		(2)		(3)		(4)		(5)		(6)	
	5-Industry Average	Rank	Men's and Boys' Clothing	Rank	Fabricated Metals	Rank	Computers	Rank	Electronic Components	Rank	Scientific Instruments	Rank
<b>AL</b>	<b>16.0</b>	<b>1</b>	<b>15.5</b>	<b>1</b>	<b>16.0</b>	<b>1</b>	<b>16.1</b>	<b>1</b>	<b>16.1</b>	<b>1</b>	<b>16.0</b>	<b>1</b>
MD	15.7	2	15.4	2	15.7	2	15.7	2	15.7	2	15.7	2
<b>SC</b>	<b>15.5</b>	<b>3</b>	<b>15.3</b>	<b>3</b>	<b>15.6</b>	<b>3</b>	<b>15.5</b>	<b>5</b>	<b>15.7</b>	<b>2</b>	<b>15.6</b>	<b>3</b>
<b>FL</b>	<b>15.5</b>	<b>3</b>	<b>15.2</b>	<b>4</b>	<b>15.6</b>	<b>3</b>	<b>15.6</b>	<b>3</b>	<b>15.7</b>	<b>2</b>	<b>15.6</b>	<b>3</b>
NY	15.4	5	15.0	5	15.5	5	15.6	3	15.6	5	15.4	5
IL	15.3	6	14.9	7	15.4	6	15.4	6	15.5	6	15.3	6
NH	15.3	6	15.0	5	15.3	7	15.3	7	15.4	8	15.3	6
TN	15.3	6	14.9	7	15.3	7	15.2	9	15.5	6	15.3	6
MA	15.2	9	14.8	10	15.3	7	15.3	7	15.4	8	15.3	6
TX	15.2	9	14.6	13	15.2	10	15.2	9	15.4	8	15.3	6
<b>ME</b>	<b>15.1</b>	<b>11</b>	<b>14.9</b>	<b>7</b>	<b>15.2</b>	<b>10</b>	<b>15.1</b>	<b>12</b>	<b>15.3</b>	<b>11</b>	<b>15.2</b>	<b>11</b>
<b>RI</b>	<b>15.1</b>	<b>11</b>	<b>14.5</b>	<b>16</b>	<b>15.2</b>	<b>10</b>	<b>15.2</b>	<b>9</b>	<b>15.3</b>	<b>11</b>	<b>15.1</b>	<b>13</b>
<b>GA</b>	<b>15.0</b>	<b>13</b>	<b>14.6</b>	<b>13</b>	<b>15.1</b>	<b>13</b>	<b>15.1</b>	<b>12</b>	<b>15.2</b>	<b>15</b>	<b>15.2</b>	<b>11</b>
NC	15.0	13	14.6	13	15.1	13	15.1	12	15.2	15	15.1	13
CA	15.0	13	14.7	11	15.0	17	15.0	18	15.2	15	15.1	13
<b>NJ</b>	<b>15.0</b>	<b>13</b>	<b>14.3</b>	<b>18</b>	<b>15.1</b>	<b>13</b>	<b>15.1</b>	<b>12</b>	<b>15.3</b>	<b>11</b>	<b>15.1</b>	<b>13</b>
<b>WI</b>	<b>15.0</b>	<b>13</b>	<b>14.3</b>	<b>18</b>	<b>15.1</b>	<b>13</b>	<b>15.1</b>	<b>12</b>	<b>15.3</b>	<b>11</b>	<b>15.0</b>	<b>18</b>
<b>VT</b>	<b>14.9</b>	<b>18</b>	<b>14.7</b>	<b>11</b>	<b>15.0</b>	<b>17</b>	<b>14.9</b>	<b>19</b>	<b>15.1</b>	<b>19</b>	<b>15.0</b>	<b>18</b>
<b>OH</b>	<b>14.9</b>	<b>18</b>	<b>14.3</b>	<b>18</b>	<b>15.0</b>	<b>17</b>	<b>15.1</b>	<b>12</b>	<b>15.1</b>	<b>19</b>	<b>15.0</b>	<b>18</b>
<b>WA</b>	<b>14.8</b>	<b>20</b>	<b>14.0</b>	<b>22</b>	<b>14.7</b>	<b>20</b>	<b>14.9</b>	<b>19</b>	<b>15.2</b>	<b>15</b>	<b>15.1</b>	<b>13</b>
PA	14.6	21	14.2	21	14.7	20	14.7	21	14.9	21	14.7	21
CT	14.5	22	14.5	16	14.5	22	14.5	22	14.7	22	14.6	22

Note: States in bold were not in the original 1986 and 1993 sample. See text and detailed technical appendix (available from author on request) for methodological details.

competitive tax characteristics were its low property taxes and investment tax credit. New Hampshire's competitive edge could be traced to its low unemployment insurance taxes. High property tax burdens tarnished the competitive standing of Maine and Vermont.<sup>20</sup>

Among the original 11 states, Texas exhibited the greatest difference in rank between 1993 and 1991. While the state ranked first in 1993, it tied for 6th place with Massachusetts in 1991. Among the full 22-state sample for 1991, it ranked only slightly above the median in most industries and tied for 9th place with Massachusetts in the overall rankings. The analysis

<sup>20</sup> In the 1993 analysis, Massachusetts generally ranked higher than New Hampshire because it offered a 3 percent investment tax credit. In 1991, the Commonwealth's investment tax credit was only 1 percent. Connecticut's competitive standing was especially depressed in 1991 because it imposed a surtax on corporate income. The surtax raised the corporate income tax rate from 11.5 percent to 13.8 percent, by far the highest in the nation.

for 1993 (as well as that for 1986) exaggerated Texas' tax competitiveness by assuming away the taxation of inventories and machinery and equipment under general property tax regimes. Texas cities and towns generally subject both categories of assets to general property taxation.<sup>21</sup>

AFTAX rankings could have changed again since 1993, because a wide variety of extensive business tax reductions have been enacted both within New England and throughout the country. For example, within New England, Connecticut is gradually reduc-

<sup>21</sup> The assumption that inventories are exempt from general property taxation is accurate for firms located in El Paso, but not for Texas manufacturers as a whole. Many of El Paso's manufacturers have "sister" plants in Mexico, known as "maquiladoras," that assemble products for them. The products are then shipped to El Paso facilities, stored there for less than 175 days, and then shipped to other states and abroad. Texas' "free port" exemption applies to inventories shipped to Texas from another location and staying in Texas for such a short period of time.

ing its statutory corporate income tax rate to 7.5 percent by the year 2000. Massachusetts' unemployment insurance taxes rose sharply after 1991, but the Commonwealth has recently adopted an apportionment formula for manufacturers that will reduce corporate income taxes for companies that sell most of their output out-of-state.<sup>22</sup> Maine has enacted a generous jobs tax credit for large firms. Furthermore, it is increasingly difficult to compute a single, state-specific AFTAX for a given industry because more and more states are granting large tax incentives to specific firms in order to induce them to locate within their borders.

### III. Does Business Tax Climate Affect Levels of Capital Spending?

Empirical evidence bearing on this issue is inconclusive. The vast bulk of studies conducted between 1950 and 1980 examining the impact of interstate tax differences on economic performance detected little or no effect. The results of more recent studies have been mixed; while some have found the impact of tax differences to be insignificant, others have found their impact to be substantial. Some follow-up studies, reestimating models used in earlier analyses with more recent data, have produced results that contradict previous findings (for example, see Carroll and Wasylenko 1994).

#### Papke's Estimates

Only one economist, Leslie Papke (1991), has evaluated the impact of business tax climate on capital spending using measures of tax climate derived from the representative firm approach.<sup>23</sup> Papke used the approach to evaluate the business tax climates of 20 states for 10 industries in 1978, creating 200 state/industry observations.<sup>24</sup> From the assumption that a

<sup>22</sup> Specifically, Massachusetts adopted single-factor apportionment based on sales for manufacturers.

<sup>23</sup> The author (Tannenwald 1995) presented preliminary results of the analysis reported in this article at the Eighty-Seventh Annual Meetings of the National Tax Association in Charleston, South Carolina in November 1994. In those preliminary results, only the original 11 states were used, observations from both 1986 and 1991 were pooled, each state's tax characteristics other than property taxes were assumed to be the same in 1991 as in 1993, assumptions about the allocation of apportionment factors were identical to those used in the commissions' studies, and no attempt was made to model the general property taxation of inventories, machinery and equipment, and intangibles. In that analysis the author found very large, positive, statistically significant coefficients on AFTAX.

<sup>24</sup> L. Papke (1991) also used the representative firm approach to

firm's sole goal is to maximize profits, she derived and estimated the following linear model of a firm's level of capital spending:

$$NK_{ij} = B_0 + B_1LPROD_{ij} + B_2AFTAX_{ij} + B_3AVGWG_{ij} + B_4ECOST_j + B_5FIREPC_j + \sum B_i D_i + E_{ij}$$

where:

NK = new capital expenditures per production worker<sup>25</sup>

LPROD = average productivity of labor

AFTAX = the after-tax rate of return to marginal investment, as estimated by the AFTAX approach

AVGWG = average wage of production workers

ECOST = statewide average cost of a million BTUs of fossil fuels and electric energy<sup>26</sup>

FIREPC = statewide average per capita expenditures on fire and police protection at the local level<sup>26</sup>

D = industry dummy variable

i = ith industry

j = jth state

E = error term

Labor productivity was included as an explanatory variable in part to control for differences across industries in technological processes. Spending on fire and police protection is a proxy for the quality of public services of most concern to businesses. One would expect the coefficient on both of these variables to be positive.<sup>27</sup> Since energy is usually complementary to capital in production, one would expect the coefficient on energy costs to be negative. Since AFTAX is inversely related to tax burden, one would expect the coefficient on this variable to be positive.

The expected sign of the coefficient on the wage variable is ambiguous. On the one hand, high wages might deter businesses from building a new plant, depressing both employment and capital spending.

estimate the impact of interstate differences in marginal business tax burdens on interstate differences in the rate of business formation.

<sup>25</sup> Capital expenditures are divided by the number of production workers in order to scale for the size of the industry in the state. As Papke points out, this variable should not be interpreted as an indicator of the industry/state's capital intensity. Such a measure would have capital stock, not capital spending, in the numerator.

<sup>26</sup> Only statewide values, not industry-specific values, exist for these variables.

<sup>27</sup> Indeed, one would expect an estimate of the relationship between the dependent variable, capital spending per production worker, and labor productivity, defined as value added per production worker, to be simultaneously determined.

On the other hand, high wages should induce the substitution of capital for labor.<sup>28</sup>

Papke estimated her model in both linear and log-log form.<sup>29</sup> When the model is estimated in log-log form, the coefficients can be interpreted as elasticities. Elasticities indicate the percentage change in one variable that results from a 1 percent change in another variable, other things equal. Thus, the coefficient on AFTAX indicates the percentage change in capital spending per worker that would result from a 1 percent change in AFTAX, controlling for the impact of other explanatory variables.

Papke's log-log results are shown in column 5 of Table 5. The AFTAX coefficient is positive and statistically significant. It implies that a 1 percent increase in AFTAX results in approximately a 1.8 percent increase in capital spending per capita. This tax variable had by far the largest coefficient of any of her explanatory variables. She also found, as expected, positive, statistically significant coefficients on labor productivity and on outlays for fire and police protection. The coefficient on the average wage variable was negative (although statistically insignificant), suggesting that high wages at a location deter expansion. The coefficient on energy costs was virtually zero, suggesting that interstate differences in energy costs had no impact on differences in levels of capital spending in 1978.

#### *Reestimation of Papke's Model Using 1991 Sample*

The author reestimated Papke's model using the AFTAX estimates from the 22-state sample and 1991 data on nontax variables. The data used in the reestimation are more current than Papke's. However, the sample is smaller because it includes fewer industries. The only departure from her model was the definition of energy cost. Papke used average cost per million BTUs of fossil fuels and electric energy for both residences and businesses. This measure was replaced by average cost per million BTUs from all forms of fuel for the industrial sector only. This was considered to be a more appropriate measure since the sample is limited to firms representative of manufacturing industries. The model was also estimated using an energy cost measure almost identical to Papke's.<sup>30</sup>

The results of the reestimations are presented in

<sup>28</sup> One would also expect an upward simultaneity bias, in that capital spending per capita raises worker productivity, which in turn raises their wages.

Columns 1 and 2 of Table 5. Like Papke's, they show a positive tax effect, but smaller and not statistically significant. The estimated elasticities of capital spending with respect to AFTAX are 0.36 and 0.72, depending on which measure of energy cost is used, between 20 percent and 40 percent of Papke's 1.8.

The elasticity with respect to the average wage variable is very close to zero, much smaller than Papke's estimate and statistically insignificant. The elasticities with respect to labor productivity and spending on police and fire protection, approximately 1.1 and 0.6, respectively, are much larger than Papke's and statistically significant. The latter estimate sug-

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*This study finds that business tax climate exerts only a small, highly uncertain effect on capital spending.*

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gests that, in choosing where to expand, businesses care about the level of certain public services. The estimated elasticity with respect to public service levels is roughly the same size as the estimated AFTAX elasticities, but statistically significant. Finally, unlike Papke's finding, the elasticity with respect to energy costs is large, negative, and statistically significant.

#### *Accounting for Differences between the 1991 Results and Papke's 1978 Results*

The 1991 results might be different because they are based on a model that takes into account a wider array of business taxes and assumes a more realistic geographic allocation of apportionment factors.<sup>31</sup> Furthermore, unlike the two Massachusetts tax study commissions, Papke assumes that throwback is oper-

<sup>29</sup> A log-log form suggests that the relationship between capital spending per production worker and its determinants is multiplicative.

<sup>30</sup> This measure was the average cost per million BTUs from all forms of fuel for both residences and businesses, not from just electricity and fossil fuels.

<sup>31</sup> Papke's AFTAX estimates do not take into account unemployment insurance taxes. Furthermore, she assumes, as did the two Massachusetts tax commissions, that all representative firms confine their payroll and property to either their home or expansion site, even though they sell most of their output at other sites throughout the nation.

Table 5  
*Estimates of Log-Log Equations Explaining Capital Spending Per Production Worker, 1991*

Explanatory Variable	Papke's 1978 Results				
	(1)	(2)	(3)	(4)	(5)
Average wage ln (AVGWG)	.030 (.142)	-.018 (.132)	.084 (.148)	.046 (.139)	-.203 (.335)
Energy cost—industrial sector ln(ECOSTIND)	—	-.758 (.263)**	—	-.561 (.317)*	-.001 (.143)
Energy cost—statewide ln(ENRGY4)	-1.152 (.393)***	—	-.791 (.480)	—	—
Police and fire spending per capita ln(POLFIRE)	.647 (.221)***	.552 (.218)**	.677 (.220)***	.632 (.214)***	.208 (.096)**
Labor productivity ln(LPROD)	1.093 (.149)***	1.122 (.150)***	1.179 (.140)***	1.204 (.138)***	.566 (.126)***
Index of change in number of production workers from 1987 to 1991 <sup>a</sup> ln(PWINDEX)	—	—	.341 (.278)	.318 (.273)	—
AFTAX ln(AFTAX)	.355 (1.828)	.723 (1.771)	1.124 (1.727)	1.352 (1.669)	1.831 (.843)**
Industry dummy SIC 232	-1.013 (.201)***	-.994 (.204)***	-.846 (.196)***	-.820 (.184)***	N/R
Industry dummy SIC 342	-.187 (.150)	-.166 (.150)	-.230 (.146)	-.208 (.147)	N/R
Industry dummy SIC 357	-.112 (.204)	-.118 (.208)	-.173 (.200)	-.180 (.205)	N/R
Industry dummy SIC 367	.585 (.138)***	.594 (.132)***	.513 (.129)***	.527 (.126)***	N/R
Constant	-4.996 (5.198)	-6.586 (4.979)	-9.845 (5.291)*	-10.830 (4.830)**	-4.760 (2.224)**
R-Squared	87.8%	88.0%	88.7%	88.9%	N/R
Number of observations	65	65	63	63	200

<sup>a</sup> This index was constructed by setting the index equal to 100 for the number of production workers in 1987. Thus an index value of 90 would indicate that employment declined by 10 percent between 1987 and 1991.

Note: Numbers in parentheses are heteroskedastic-consistent standard errors (White 1984). N/R: Not reported.

\*Significant at the .01 level, two-tail test.

\*\*Significant at the 0.05 level, two-tail test.

\*\*\*Significant at the 0.005 level, two-tail test.

Source: U.S. Bureau of the Census, *Annual Survey of Manufactures, 1991*; U.S. Bureau of the Census, *Census of Manufactures, 1987*; U.S. Bureau of the Census, *Government Finances, 1985-86 and 1990-91*; unpublished data from various state tax equalization boards; Commonwealth of Massachusetts (1987); S. H. Brooks Co., Inc. (1993); and L. Papke (1991).

ative. This assumption significantly affects her AFTAX estimates.

The discrepancy in results of the two studies may also be partially attributable to the difference in the general condition of the national economy between 1978 and 1991 and the mix of states and

industries represented in each sample. Both sets of results may also be biased by a failure to control for differences in economic conditions across states and industries.

*The general condition of the national economy.* While the national economy was expanding in 1978, it

was contracting in 1991. Capital spending per production worker may be more sensitive to marginal business tax burdens during economic expansions than during recessions. In recessions, business income is depressed, reducing or eliminating many firms' liability for profits taxes. The types of investment projects most likely to be undertaken during a recession may be less influenced by interstate tax differences than those most likely to be undertaken during an expansion.<sup>32</sup>

*Mix of industries.* Papke used a broader array of industries than those represented in the 1991 sample, as well as a lower level of disaggregation. The industries represented in her sample but absent from the 1991 sample may be more footloose and, therefore, more sensitive to interstate differences in tax burdens.<sup>33</sup>

*Mix of states.* So many differences across states may affect interstate variation in levels of capital spending per production worker that it is difficult to control for all of them. Consequently, Papke's results may diverge from those obtained from the 1991 sample because she examined a different set of states.<sup>34</sup>

*Failure to control for differences in business conditions across states and industries.* Since the severity of a recession varies by state and industry, so does the magnitude of cuts in employment. However, there might be much less interstate and interindustry variation in the severity of reductions in capital spending because depreciated plant and equipment require continual maintenance and renovation. Consequently,

in 1991 the relative severity of the economic contraction experienced by a state or industry may have influenced its capital spending per worker. Failure to control for interstate and interindustry differences in general business conditions might therefore have biased estimates of the AFTAX coefficients.

In order to control for this possible bias, the author included a measure of employment growth between 1987 and 1991 (PWINDEX) as an additional explanatory variable and reestimated the model (Table 5, columns 3 and 4). The reestimated AFTAX elasticities, although larger and more precise than those reported in columns 1 and 2, are still statistically insignificant.

#### IV. Conclusion

This study of the impact of state and local tax burden on business's capital spending in 1991 found a small effect that was statistically insignificant. This finding buttresses existing empirical evidence that the effectiveness of state and local tax policy as an instrument of economic development is uncertain. While tax characteristics may affect a state's competitiveness, policymakers should view with caution claims that changes in tax policy will dramatically improve their state's economy. Enhancing public services valued by firms may be a more effective economic development strategy.

Regardless of their views on the extent to which state and local taxes "matter," policymakers need better indicators of their state's tax competitiveness. Too often, the measures used, although simple to calculate, are inaccurate. The indicator developed and reported in this article, although difficult to compute, provides a more accurate, comprehensive evaluation of a jurisdiction's tax climate from the perspective of a rational, well-informed, profit-maximizing business executive.

Many states with a relatively attractive business tax climate according to this measure rate poorly according to those indicators most frequently cited in public debate. In New England, the most dramatic example is Massachusetts, still called "Taxachusetts" by many observers. The analysis presented in this article affirms the conclusion of tax reform commissions that have evaluated the Commonwealth's tax competitiveness in recent years: Taxachusetts is a vestigial nickname that does the Commonwealth an injustice.

<sup>32</sup> Cooper and Haltiwanger (1993) argue that, during recessions, businesses tend to undertake acutely needed "retooling" of obsolete facilities because factor productivity is low and, therefore, the opportunity costs of reducing production during renovation and modernization are thereby minimized. These investment projects may be less influenced by tax considerations because their profitability is relatively clear-cut.

<sup>33</sup> Evidence presented by L. Papke (1987) casts doubt on this hypothesis. She estimated separate AFTAX elasticities for the industries represented in her sample. Four of these industries—apparel (SIC23), computers (SIC357), electronic components and accessories (SIC367), and instruments of measurement and control (SIC382) are similar or identical to those represented in the 1991 sample. In Papke's sample the AFTAX elasticities of these four industries ranked 1st, 17th, 10th, and 3rd, respectively.

<sup>34</sup> In fact, when the states represented in the 1991 sample are limited to those also represented in Papke's, the estimated AFTAX elasticity rises to 1.0 or 1.3, depending on the measure of energy cost used. However, in both cases, the standard error is more than three times the estimate. Ideally, the difference between the two studies in the representation of each state in the sample should also be taken into account. Papke weighted each state equally. The 1991 sample weights some states more than others. However, since some states in the 1991 sample have only one observation, equal weighting would reduce the sample size to 22, the number of states. With so few degrees of freedom, estimated elasticities would be prohibitively imprecise.

Vigorous interstate tax competition will probably continue into the foreseeable future. The analysis presented in this article suggests that other competi-

tive tactics may be more effective and highlights the need for further research into the measurement and economic significance of tax competitiveness.

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