

Where We Stand—1996: Business Tax Competitiveness among the Great Lakes States

**James A. Papke
Purdue University**

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1 Introduction: Purpose and Scope

Interjurisdictional competitiveness to retain or attract potentially mobile business enterprises has multiple dimensions. It encompasses, among other policies, information and research services, public expenditures, regulations, and tax incentives and concessions. Attempts to measure the success of these various approaches encounter similar conceptual and estimation problems. For example, what is the yardstick of success? Is it increases in capital investment, employment, personal income, economic welfare, or all the above? Are these objectives mutually exclusive and are they compatible (see Courant, 1994)? A set of specific but related issues includes the methods of demonstrating the linkage between public policy and economic variables, the specification of what jurisdictions are actual competitors, and the elements of the competition (e.g., wage rates, infrastructure, climate, business taxes, and the like). Other contributors to this symposium address several of these issues (see the papers by Eberts, Holmes, Kitchen and Stock, and Oakland and Testa). This paper is limited in its scope both as to what the competitor states are and how to measure and rank state tax competitiveness: It focuses on the six Great Lakes states and the comparative level of their business taxes as reflected in the after-tax rate of return on new capital investment.

There is no simple way to answer the question of whether state and local business taxes in Illinois are competitive with those in Wisconsin or Indiana. While statutory tax rates may be higher in one state, the definition and derivation of its tax bases may be narrower. Firms in one industry may have comparatively high taxes, while firms in another or even the same industry in the same state may have relatively low taxes. In Indiana, for example, the effective property tax rate applied to real and personal property in Burns Harbor is approximately one-quarter the rate in Hammond. Two corporations with identical economic profiles would pay widely disparate tax bills depending upon their specific in-state location. There is also the question, What is a business tax? Are payroll taxes, for example, business taxes or taxes imposed on and ultimately paid by labor? The list of complexities is expansive. However formidable the analytical obstacles, subnational tax policy and particularly firm-specific tax concessions are presently being formulated on the basis of factual, anecdotal, or intuitive reference to one or another measure of the competitive position of state-local business taxation. The importance of meaningful quantitative analysis in these policy decisions is evident; at the least it may help dispel factual misconceptions and generalizations.

This paper represents an attempt to provide some basic understanding of and insights on the questions of the appropriate measurement and meaning of comparative levels of business taxation among the Great Lakes states and their implications for investment location decisions. The section to follow outlines several alternative approaches employed to measure interjurisdictional business tax differentials. The characteristics, specifications, and limitations of the microanalytic simulation model AFTAX are provided in Section 3. Sections 4 and 5 describe the geopolitical and industry boundaries of the simulations undertaken for this paper. The results of the AFTAX simulations are presented and discussed in Section 6. Section 7 explores the general relationship between disparities in the level of business taxation and economic growth rates. The main conclusions and directions for further research are presented in Section 8.

2 The Analytical Framework for Measuring Interjurisdictional Business Tax Differentials

The decision to measure competitiveness by interjurisdictional business tax differentials raises a set of conceptual and estimation questions centered on the choice of a methodology that can reduce a large number of diverse tax systems and provisions, locations, and industry characteristics to a meaningful common denominator for ranking purposes. In this section, several alternative methods are critically explored and the method adopted for the paper is outlined.

2.1 Aggregative Approaches

As its designation suggests, aggregative approaches to the measurement of interstate tax differentials are based on total tax collections relative to some global measure of taxpaying capacity or ability. Few or no distinctions are made between business and household sectors or by type of tax. In its simplest and most general form, competitive tax levels are expressed as total state and local taxes as a percent of total population (i.e., in per capita terms) or total taxes as a percent of total resident personal income. Table 1 shows these two relationships for 1993 (the latest year for which comparable data are available) and their respective rankings for the seven states of the Midwest, including the six Great Lakes states and other selected states. The U.S. averages are also provided.

With reference to table 1, are state and local tax payments in Illinois relatively “high” at \$2,331 per capita, ranked 17th in the nation and third among the Midwest states, or “low” when these payments represented 10.8% of personal income, ranking the state 38th overall and 6th in the region? Michigan, Minnesota, and Wisconsin display more consistent relatively “high” tax rankings; similarly, Indiana and Ohio rank uniformly “low.” The usefulness of these simplistic popular measures is limited for any analysis of competitive business taxation. The single number representing total taxes imposed upon all taxpayers, businesses, and households does not disclose differences between the states in the distribution of tax payments among major groups of taxpayers nor in the types of taxes paid. Moreover, in some cases the two ratios present contradictory results (note particularly California, Illinois, and Massachusetts).

Attempts to refine these global aggregative ratios have concentrated primarily on estimating the share of total state and local taxes paid by business or relating business tax payments to some aggregate measure of business taxpaying capacity. Wheaton (1983) employs an estimate of state business net income, Oakland and Testa (1996) use gross state product, and the Advisory Commission on Intergovernmental Relations (ACIR) (1981) employs share analysis. All these attempts encounter the usual estimation problems in determining business tax payments and problems in the designation and derivation of the measure of business taxpaying capacity. An example of a so-called refined aggregative measure is given in table 2, where the same states included in table 1 are ranked on the basis of estimated state and local business and nonbusiness taxes as a percent of personal income. By this comparative measure, the Midwest states are all ranked in the top half (high tax) of the national rankings. Interestingly, Indiana and Minnesota are tied at 26th overall and share the distinction of having the lowest ratio of business taxes to personal income in the Midwest. Michigan, on this basis, ranks 45th in the nation with one of the heaviest business tax impositions.

Table 1 Total State and Local Taxes Per Capita and as a Percent of Personal Income, Midwest and Selected States, 1993

	Per capita	Rank	Percent personal income	Rank
Midwest States				
Illinois	2,331	17	10.79	38
Indiana	1,917	37	10.52	43
Iowa	2,206	22	12.10	12
Michigan	2,366	14	12.06	13
Minnesota	2,677	6	13.21	6
Ohio	2,053	31	10.90	34
Wisconsin	2,527	9	13.34	4
U.S. Average	2,293		11.52	
Selected States				
Arkansas	1,591	48	10.40	45
California	2,397	12	11.18	25
Connecticut	3,335	3	12.22	11
Florida	2,055	30	10.58	42
Kentucky	1,819	39	11.17	26
Massachusetts	2,666	7	11.34	22
Tennessee	1,682	46	9.66	47
Texas	1,934	35	10.73	39

Source: U.S. Department of Commerce, Bureau of the Census, unpublished data from the Internet.

Alternatively, table 3 gives the ratio of state and local business taxes as a percent of private sector gross state product (GSP) for the five states comprising the Seventh District of the Federal Reserve System. GSP measures the incomes accruing to the factors of production from goods and services produced within the state, that is, employee compensation, proprietors' income, indirect business taxes, and capital-related charges such as corporate profits, net interest, and capital consumption allowances. The main difference between GSP and the personal income measure employed in table 2 involves capital income. The latter includes capital income received by individuals in the form of dividends only; GSP includes corporate profits and depreciation. GSP also attributes capital income to the state in which the activity occurs; personal income, in contrast, attributes dividends to the resident state of the asset holder. Thus, the business tax to GSP ratio represents an improvement over the other aggregative approaches in that it recognizes it is taxes paid, at least initially, by business that are relevant and that income generated by business activity is a more appropriate index of comparative taxable capacity than the income of persons. As indicated in table 3, Indiana and Wisconsin are the comparatively "low" tax states by this measure and Illinois and Iowa relatively "high" tax jurisdictions. Contrast these results with those in tables 1 and 2.

All of the refined aggregate measures suffer from an inability to account for differences among the states in the kinds of business taxes paid and to isolate the tax factor from nontax considerations, and from inclusion of the tax payments of all types of

Table 2 State and Local Business and Nonbusiness Taxes as a Percent of Personal Income, National Ranking, Midwest and Selected States, 1993

	Relative national rank ^a	
	Business	Nonbusiness
Midwest		
Illinois	40	12
Indiana	26	12
Iowa	37	33
Michigan	45	28
Minnesota	26	48
Ohio	30	23
Wisconsin	36	46
Arkansas	10	23
California	33	28
Connecticut	37	33
Florida	20	15
Kentucky	6	37
Massachusetts	17	38
Tennessee	17	3
Texas	20	15

^a1=lowest tax ratio, 50=highest tax ratio.

Source: U.S. Department of Commerce, Bureau of the Census.

business enterprises. With respect to the components of business tax structure, taxes that reflect the volume or profitability of business may differ in their competitive impact from taxes that impose direct penalties upon the expansion and improvement of industrial facilities. A comparatively high property tax, for example, might be regarded as a fixed overhead charge and weigh more heavily in the investment location decision than net income or value-added taxes. Similarly, taxes that approximate the benefits (costs) of the public services provided to the business sector or the value of a particular location are less locationally significant than arbitrarily imposed levies.

A related problem is the employment of business taxes in general rather than the tax payments of “footloose” industries or firm—that is, those that are more likely to be locationally sensitive to tax-level disparities. Total business taxes usually include those paid by mining and construction companies, utilities, retail and wholesale enterprises, and providers of personal and business services. These types of businesses generally have little choice but to locate where the market for their product or service or the source of their raw materials is. The tax-sensitive segment of the business sector, on the other hand, can operate from facilities capable of serving a large market area and obtain supplies and raw materials from a number of alternative locations. Manufacturing is the primary tax-sensitive industry, but there are significant differences in the degree of mobility within the manufacturing sector. Specifically, manufacturing types with a relatively high ratio of site-specific value added to transportation costs are most likely to have choices among alternative locations. These would include, for

Table 3 State and Local Business Taxes as a Percent of Private Sector Gross State Product, Seventh District States, 1992

Seventh District States	Tax/GSP	Rank ^a
Illinois	3.6	5
Indiana	2.9	1
Iowa	3.5	4
Michigan	3.3	3
Wisconsin	3.2	2
Average	3.4	

^a1=lowest tax ratio, 5=highest tax ratio.

Source: Adapted from W.H. Oakland and W.A. Testa (1996).

example, manufacturers of automotive equipment, drugs, office, computing and communications equipment, scientific instruments, and the like. Banking and other financial services are also becoming increasingly footloose.

A major shortcoming of all the aggregative methods is their inability to isolate the impact of taxes from other competitive nontax elements. For example, the difficulty with using GSP, the sum of total factor input costs, in the denominator of the tax impact ratio is that it ignores differences in profitability among the different states. A high ratio of business tax to costs need not mean a state is taxing heavily relative to other states; it may simply indicate that nontax costs are comparatively low or that a strong interdependence exists between taxes and business costs (i.e., tax instruments that are similar to user charges). Similarly, employing net income ignores differences in factor costs among competing states. A state may have a relatively high tax to net income ratio because of high factor costs and low profitability irrespective of the business tax structure. Further, a decline (increase) in the general level of economic activity can reduce (increase) the denominators of these measures to a greater (lesser) extent than it decreases (increases) the numerator. None of the measures takes into account the federal tax offset for state and local business tax payments. Nor do they reflect the prospective character of the investment-location decision process, which is at the core of the competitive business tax issue. In a word, the approaches do not capture the features of the tax structure that are relevant to investors.

To sum up, the point to emphasize in this section is that the various aggregative approaches to the measurement of competitive business taxation have little to offer policymakers or potential investors in the way of meaningful and operational comparative statistics. They may be useful in describing the overall appearance of the tax structure but they can be misleading and often contradictory in their results and inappropriate for the analysis of the competitive impact of subnational taxes or of industry/firm comparative tax burdens.¹ This suggests an avenue of disaggregative or microanalysis of the relative tax payments of particular industries or firms at alternative locations and involving multiplant, multisite locations.

2.2 Disaggregative Approaches

The focus of disaggregative approaches is a set of questions vital to policymakers and investors alike relative to the tax-paying field for investment: For taxpayers in a given industry, what is the burden of business taxation imposed at, say, an Illinois location? How does this tax burden compare with that imposed in Indiana or other competing states? How does this tax burden compare with that imposed on other industries in Illinois? These are complex interactive questions that cannot be addressed with any of the aggregative methods described earlier. And of the several disaggregative models, some are more useful and reliable than others. These alternatives are briefly explored here.

2.2.1 The Representative Sample Approach

The representative sample approach involves the selection of actual businesses from the total population of businesses. The total population consists of all business enterprises in the six Great Lakes states. So that all elements of the population have an equal chance of being selected, random sampling procedures have to be followed. Further, if the sample is to represent a meaningful classification, the selection must be of sufficient size and drawn from strata reflecting both firm size and industry in each of the states.

Following the sample selection, the next step is the computation and measurement of comparative tax costs; What are the total taxes paid by firm A in Illinois and firm B in Indiana? There are two principal sources of actual tax payments data. The first is tax returns filed by the businesses with the federal, state, and local government; the second is the business itself by means of questionnaires, interviews, or direct access to accounting records. The actual tax payments are then related to some characteristic of a firm's taxpaying capacity (e.g., net profits, net worth, assets, gross receipts). Finally, there is the aggregation of the firms' data to industry relationships and interpretation and generalization about the entire business sector from characteristics of the stratified sample. With appropriate statistical techniques it is possible to compare tax competitiveness among industries in the different states. Similarly, it is possible to estimate whether the variations in the tax index between individual taxpayers in the same industrial stratum are equal to, greater than, or less than the variations among industries and between states.

Theoretically, the representative sample approach is a sound method for measuring cross-firm, tax burden differentials, but the informational requirements beginning with the first step preclude its adoption and account for the fact that it is seldom employed in comparative tax studies. A listing of all taxpaying businesses delineated by industry in each of the six states, or, for that matter, any state, is not readily available. Even if the sample could be identified, stratified, and selected, there is no practical way of obtaining the information required to measure tax payments. Access to filed tax returns is prohibited and the responses to questionnaires or interviews are likely to be inaccurate and of questionable value. Further, the method looks at a one-year snapshot of tax payments on previous investments, not prospective investments. In short, the representative sample approach to the measurement of comparative business tax burdens is not a viable alternative.

2.2.2 The Actual Firm Model

The actual firm model contains some of the elements of the representative sample approach in that the comparative measures are derived from the actual tax payments of operating enterprises. Two or more business entities are selected in two or more taxing jurisdictions. The selection process, though less demanding, still requires that the businesses selected be similar with respect to size, location, product or service, and basic operating characteristics. The problems of tax return accessibility are less severe than in the sample approach because of the relatively small number of enterprises, but the same limits of confidentiality and insufficiency pertain. Moreover, the resulting measures of comparative tax differentials are related to past decisions and are necessarily limited in their interpretation and application to the business community generally because the evidence is, in effect, anecdotal.

2.2.3 The Hypothetical or Representative Firm Construct

The hypothetical or representative firm construct involves the modeling of two or more businesses with locations and operating characteristics intended to capture the critical issues pertaining to real cross-firm, cross-industry, comparative tax burdens. The approach imposes few requirements beyond realism in replicating firm operating ratios, balance sheets, and income statements, and uniformity and consistency in the application of relevant tax laws and parameter assumptions. The hypothetical firm differs from the representative sample and actual firm approaches in that its tax payments are not actual but derived from the assumptions characterizing the firm's operating characteristics and from application of the statutory language of published tax laws, irrespective of administrative discretion and interpretation. Although the answers provided by the hypothetical firm method are applicable only to the model types, the use of statistical surveys in firm selection and design can ensure realism in the profiles of the different types of firms or industries.

The selectivity of this approach is an advantage in that it provides the opportunity to concentrate the research effort on particular firm characteristics (e.g., small vs. large, manufacturing vs. retailing, single state vs. multistate) and specific tax provisions that affect long-term investment decisions (e.g., depreciation rates, apportionment formulae, tax credits), and to experiment with alternative policies and industrial development strategies. The approach is especially adaptive to microanalytic computerized simulations of an interactive, multiperiod, real-world economic environment (see J. Papke, 1995; Bartik et al., 1987; Tannenwald, 1996). Decisionmakers can take control of a typical company and isolate the consequences of their past and future tax actions without confidentiality constraints and without fear of jeopardizing existing tax arrangements.

2.3 The Dimensions of Comparative Tax Burdens

Just as there are alternative approaches to measure interjurisdictional business tax differentials, there are alternative dimensions of the tax burden. Both macro and micro approaches typically employ a tax burden ratio for measuring and ranking relative tax levels: the tax payments of the subjects of comparison are divided by some

fiscal characteristic reflecting taxpaying capacity. Reference was made earlier to population, personal income, and GSP as capacity indicators. Given the decision here to analyze comparative tax burdens at the level of the firm, what is an appropriate standard or yardstick of comparative interfirm and interindustry tax burdens? If similarly situated firms are to be taxed equally, absent intentional intervention, what is the appropriate index of equality?

In the long run, the business enterprise's contribution to the local or state economy involves its investment decision—that is, the decision to maintain, expand, or contract plant and equipment and consequently income and employment. Business investment is undertaken in anticipation of a positive rate of return or a stream of future income expected to flow from the purchase of productive assets. The tax incentives or disincentives to resource allocation and entrepreneurship bear closely on the stream of net after-tax income.

In order to capture the competitive location/relocation effects of subnational business taxation, the yardstick should be linked directly to the investment decision. The present study measures comparative tax burdens from the point of view of a typical firm contemplating the “bottom line” of a new long-term investment commitment. The after-tax rate of return (ATRR) on an incremental or marginal investment is the yardstick employed here to capture the complex interaction of different types and levels of business taxation within and between the six Great Lakes states. For competitive purposes, it is important to measure the tax that will be paid if the new investment is made in one place rather than another. The ATRR is relevant to actual investment decisions and can also be employed to compare tax-cost differentials with other cost factors (e.g., labor, land, energy, etc.) in the operations of the business enterprise.

The ATRR on an incremental investment denotes the ratio of net income generated per dollar of new assets invested. Business tax burdens are uniform with respect to firms in the same industry, different industries, or states when approximately the same ATRR on an incremental investment project is obtained. To the extent there are significant net profit differentials, the tax system produces distortions in resource allocation and investment location (what economists refer to as efficiency losses).

In the exposition, the results of the tax computation simulations can be expressed in two interchangeable ways: the ATRR, as described above, and the mathematically equivalent effective marginal tax rate (EMTR). The EMTR is simply the proportional difference between the pretax and post-tax rates of return on an increment of capital stock. For example, if the pretax rate of return on an investment is 20% and the ATRR is 13%, the tax wedge is 7% and the EMTR is 35% ($7\% \div 20\%$). From a firm's perspective, the impact on “the bottom line” of a particular business tax regime can be described either as an ATRR of 13% or an EMTR of 35%. Both measures capture the competitive incentive/disincentive effects of business taxation in the investment decision process.

2.4 Tax Impact and Incidence

For purposes of comparative business tax analysis, all approaches assume that taxes paid are borne by the business enterprise as a separate and distinct economic entity. That practice is followed here. No allowance is made for the possible transferability or “shifting” of business tax payments; technically, the before-tax rate of return

is unaffected by changes in the tax rate. The literature on subnational business tax incidence or ultimate burden is understandably sparse and inconclusive (see McLure, 1971, 1981; Mieszkowski, 1969, 1972). Tax incidence requires data on firm and market supply and demand conditions, pricing policy, the nature and degree of competition among producers and sellers of the product, the location of sales, and the like. In the absence of these data and a common conceptual framework for the analysis of national and subnational business tax incidence, comparative business tax studies measure tax impact from the point at which the tax is imposed and include the caveat that the quantitative results may be tempered by the possibility of tax shifting.

The decision to clock the impact of business taxes at the level of the business itself and disregard the possibility of tax shifting also implies that tax-cost differentials, in the short run at least, are not capitalized in nontax costs, such as wage rates, land, and/or product prices. Capitalization is the process by which a stream of tax payments is incorporated into the price of assets or labor. In the long run in open economies with competitive markets, the mobility of capital and labor ensures that the ATRR on all assets for all firms in all locations, adjusted for risk, is equalized. In equilibrium, the only difference between high-tax, and low-tax firms is higher pretax rates of return in the former and lower rates in the latter.

2.5 Summary

In measuring interstate comparative tax differentials, aggregate data on tax shares, tax payments, and the like are frequently used to compute measures of “average rates” of business taxation. Alternatively, a one-year snapshot tax liability of representative or actual firms in specific industries is calculated, related to some index of taxable capacity, and the locations ranked according to these ratios. As subnational business taxation and its relationship to economic development come under increasing scrutiny, the inability of these approaches to provide consistent and meaningful rankings becomes apparent. The aggregate studies cannot isolate the tax from nontax cost differentials, nor can they take into account differences in the kinds of taxes and tax provisions paid by different types of businesses.

The one-year tax liability computations are misleading because they are the sum of different taxes on different capital investments, varying widely in age and valuation. Further, they provide an inaccurate description of an investment process that yields income flows and tax liabilities that vary over an extended time path. Firm benefits or costs from various tax provisions cannot be captured with a methodology that simply calculates tax liabilities for a single year. Comparing the simple ratio of actual or hypothetical tax payments to measures of taxable capacity—the average tax rate—fails to indicate the competitive and incentive impact of business taxation on new investment. The primary difference between average tax rates and marginal tax rates involves the distinction between ex post and ex ante tax payments. Ex post or average taxes mix investments with different tax treatments by reflecting tax paid on assets acquired in earlier years under possibly different tax regimes (tax rates, depreciation allowances, tax credits, and the like). Meaningful comparative tax analysis accounts for the fact that a firm contemplating a new (marginal) investment is concerned with expected tax liabilities and the impact of these liabilities on the total tax bill of the firm.

The shortcomings of these various approaches coupled with the increasing availability of improved data and high-speed computing technologies have served to advance the state of the art of comparative subnational business tax analysis. The most important development in recent years is the widespread use of microanalytic simulation models of hypothetical firms as the standard tool of comparative business tax burden analysis. These models (J. Papke, 1995, 1996; Tannenwald, 1996) simulate the impact of business taxation at the lowest level of disaggregation—the individual firm—so that a variety of policy questions can be addressed. Microanalytic simulation models of firms' investment decisions isolate tax costs by holding nontax factors constant. The models also capture the interaction of federal, state, and local taxes. Because of their flexibility, the models can determine if the tax systems favor or disfavor firms by size or operating characteristics, or whether specific tax provisions affect different firms in different ways. Further, the sensitivity of the simulation results to variations in key assumptions and parameters can be tested. The microanalytic simulation approach also captures both the level and distributional patterns of tax liabilities over time. Finally, the microsimulation model can account for the consequences and interactions of subnational business taxation on firms situated in more than one location. In the following section, the AFTAX microanalytic simulation model employed here is described.

3 The AFTAX Model

An extended discussion of the calibration and solution of the simulation model for deriving the ATRR/EMTR estimates presented in this paper is contained in several publications (J. Papke and L. Papke, 1981; J. Papke, 1986, 1992). For those not familiar with this literature, this section provides an abbreviated description of the methodology, parameters, scope, and limitations of the analytical framework.

3.1 Measuring Interstate Tax-Cost Differentials

The standard for the comparison of interjurisdictional investment tax-cost differentials is the ATRR or EMTR on an incremental investment at a site-specific location. At any location in the U.S., the federal, state, and local business tax “system” imposes a wedge between the rate of return on an incremental capital investment before and after taxes. When expressed as the present value of expected taxes relative to the expected income from the investment, the ratio measures tax-cost differentials in the context of the actual process that profit-maximizing businesses employ when selecting from among alternative investments and locations. The view of taxes is prospective in that it looks at the expected tax consequences of a marginal capital expenditure on the firm's “bottom-line” or after-tax profits. In competitive equilibrium, the firm equates the net cost of the asset to the present value of these net returns (alternatively, the marginal product of capital equals its cost).

The ATRR/EMTR calculation summarizes a detailed examination of the impact of the national and subnational business tax systems on the return to investment. With a given before-tax rate of return, an incremental investment generates an income flow to which specific taxes apply, yielding an after-tax cash flow and an ATRR that reflect the impact of the taxes on the income generated by the investment. Recall, the

EMTR is the difference between the before- and after-tax rates of return expressed as a percentage of the before-tax rate of return. The ATRR/EMTR are commonly used measures of comparative national and subnational business taxation because they account for the time value of money over the life of the investment and are sensitive to specific components and timing effects of the tax system, such as tax rates, the treatment of depreciation, other deductible expenses, and tax credits.²

3.2 Model Parameters

The financial parameters of the model provide details on a firm's income statement and balance sheet.³ They include the dollar value of physical assets by asset type (machinery, equipment, building, land, inventory), financial assets, and sales/gross receipts. Each investment decision is characterized by a particular combination of firm size, industry, and asset composition so as to reflect the impact of business taxation on the various classes or types of business enterprise and on the level and pattern of assets.

The tax parameters detail the statutory provisions included in the comparative analysis. They include the relevant provisions from the following taxes: federal corporate income tax; state corporate income and franchise taxes; state and local property taxes; and state and local sales taxes on capital equipment and energy purchases.⁴ Statutory tax parameters allow for the interaction between federal, state, and local taxation and for the effects of tax law changes. Variations in the tax parameters and their corresponding impact on the ATRR/EMTR determine the relative importance and sensitivity of ATRR/EMTR to different tax instruments and specific tax provisions.

The model's operational parameters designate the location of the representative firm and the location of its investment and sales.⁵ They include the following: the location(s) at which the firms conduct business; the percent of operations in each location; the amount and composition of the new investment; the location of the new investment; and the destination of product sales. Because the only interjurisdictional differences intended to be measured by AFTAX are those attributable to taxes and/or tax changes, the model assumes that production techniques, labor costs, the quality and availability of public services, and other operating expenses and noncost factors are equal in all locations; that is, the ratio of the value of the firm's output to the value of its capital assets is the same at all locations.

3.3 Model Format and Procedure

The AFTAX model proceeds by first calculating a "baseline" ATRR/EMTR for an ongoing representative corporation. Given an assumed 20% pretax rate of return, the firm's stream of income generated by its current investment maintained over a specified time period (60 years) is subject to a set of federal, state, and local tax parameters. The result is an after-tax income flow and an ATRR. The ATRR is defined as the discount rate that equates the present value of the annual income stream to the cost of the capital investment. The difference between the pretax and after-tax return is the tax wedge, and the EMTR is the tax wedge divided by the pretax rate of return.

A second set of simulations produces a different net profit stream from an expanded (by 10%) investment and a different ATRR/EMTR. The new rate is prospective in that it reflects the anticipated change in future tax liabilities. A comparison of the two tax-cost measures captures and describes the net investment incentive effects of subnational business taxation and the results identify, at the margin, the tax consequences relating to decisions about where to locate investment.

3.4 Model Assumptions and Limitations

An awareness and appreciation of the underlying assumptions and limitations of the AFTAX model are essential to an understanding of its outputs and applications.⁶ All values in the AFTAX model are in current dollars, implying a zero or fixed rate of inflation. The model also assumes that all investments are financed from internal sources. The model employs a partial equilibrium approach to isolate and describe the impact of the different tax regimes on the return from a marginal investment. Consequently, the simulation results cannot be used directly to estimate second-order macroeconomic effects such as tax revenue gain (loss) or employment/investment behavioral (induced) effects. They are useful, however, as inputs to econometric studies of investment behavior (see J. Papke and L. Papke, 1981; L. Papke, 1991; Tannenwald, 1996).

The ATRR/EMTR measurement focuses on the tax burden imposed on corporate profits—that is, the burden from the point of view of the firm. The analysis is limited to nonfinancial corporate investment and to the taxation of stand-alone C corporations. It excludes the noncorporate sector; that is, unincorporated businesses and Subchapter S corporations. Nor does it address the interaction between the taxation of individual investors and the taxation of the corporate business enterprise.

Although the model is dynamic in form, static expectations with respect to federal, state, and local tax policy are assumed; that is, investment is planned on the assumption that current tax bases, tax rates, depreciation provisions, and the like will prevail in the future. The model also abstracts from all considerations of risk. This is admittedly unrealistic given the nature and magnitude of the several federal tax restructuring proposals under consideration, state budgetary processes, and the role of expectations and uncertainty in investment decisions.

No distinctions are made among firms on the basis of their respective life cycles. Consequently, AFTAX does not differentiate between new, immature, and mature firms. The model corporations are operating profitably when the decision to expand investment is made. For simplification, the representative firms are assumed to produce and expand with fixed proportions of each type of capital asset (machinery, equipment, structures, land, and inventories).

The AFTAX simulations depend upon government survey data, the interpretation and administration of, and compliance with, tax statutes, and assumptions regarding functional economic relationships (e.g., firm profit maximization and the cost of capital function). Although every effort is made to be specific and accurate, it is not possible to simulate exact statutory tax language and rules and regulations in every detail. The application of tax rules, particularly at the subnational level, is often

subject to administrative interpretation and discretion. While the ATRR/EMTR calculations appear more quantitatively precise than they actually are, they do provide a meaningful and consistent summary measure about the quantitative impact of the business tax structure on the return to investment.

4 Site Selection

The geographic boundaries of this analysis encompass the six states comprising the Great Lakes states: Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. The selection criterion for the sites within each of these states is based on county employment growth rates over the ten-year period 1982-1992. For a detailed description of the site selection process, economic base profiles of the sites, see J. Papke (1995). The sites included in the analysis here are the following:

State	County	City
Illinois	DuPage	Naperville
Indiana	Allen	Fort Wayne
Michigan	Kent	Grand Rapids
Minnesota	Hennepin	Eden Prairie
Ohio	Franklin	Columbus
Wisconsin	Dane	Madison

5 Representative Firms and Operating Profiles

The selection of representative firms from within the pool of industry types is intended to reflect a range of capital asset portfolios and to include industries typically with significant export orientation and location choices. Representation also includes two industries dominated by small enterprises (i.e., retailing and business service firms).

- Manufacturing:
 - Food and kindred products (SIC 20)
 - Apparel and other textile products (SIC 23)
 - Lumber and wood products (SIC 24)
 - Furniture and fixtures (SIC 25)
 - Printing and publishing (SIC 27)
 - Chemicals and allied products (SIC 28)
 - Fabricated metal products (SIC 34)
 - Machinery, except electrical (SIC 35)
 - Electrical and electronic equipment (SIC 36)
 - Motor vehicles and equipment (SIC 37)
 - Instruments and related products (SIC 38)
- Transportation, Communication & Public Utilities:
 - Communication (SIC 48)
- Retail:
 - General merchandise stores (SIC 53)
- Services:
 - Business services (SIC 73)

The industry pool is limited to nonagricultural, nonfinancial sectors. Primary industries (e.g., agriculture and mining) are excluded on the grounds that they are spatially immobile. Other industries with significant location-specific requirements, such as tobacco, petroleum, rail and water transportation, pipelines, and banking are also not included. The tax sensitivity of retailing and business services is a special case because their markets are spatially defined, and relocation necessitates the development of a new customer base. But these firms also typically have relatively little fixed invested capital that serves to facilitate migration. Firms with small fixed capital investment are better able to pick up their capital and transport it to alternative sites than are many manufacturing firms with substantial plant and equipment investment (i.e., high transaction costs promote location inertia).

5.1 Location of Production Facilities and Product Sales

Because tax payments depend on a firm's expansion pattern, specification of the firm's geographic location of its production facilities and product/service sales is required. The model firms examined in this study are assumed initially to have 100% of their property and 100% of their payroll in the state of domicile (homesite). Their sales, however, are assumed to be distributed 10% to the home state, 80% to other taxing states, and 10% to nontaxing (no nexus) states (i.e., the firms are producing entirely in the state of domicile and selling 90% of their product out of state). They are export-oriented business enterprises serving a regional and/or multistate market.

In the baseline simulations, the parent facility and the 10% investment expansion project are both located in the home state. The cross-industry tax-cost differentials, therefore, reflect the tax structure of only one state. In the case of the cross-border investment flows, the parent firm is assumed to expand investment in a state in which it is already selling 10% of its output. When the firm expands out of state, a larger share of the combined income of the enlarged firm is taxed by the two (or more) states.

6 Results of the Simulations

6.1 Baseline Simulations: Homesite Expansion

Table 4 shows the ATRR by state and industry of companies expanding operations at existing locations (i.e., the parent and expansion facilities are both located in the same state). It also contains the combined regional data. These baseline simulations indicate how the tax structure of each state impacts differentially on the various industry types within that state. For example, an Illinois manufacturer of food and kindred products earns a 12.2% rate of return on an expansion of its plant and equipment in Illinois. The Illinois manufacturer of automotive equipment realizes a profit rate of 12.4% on its marginal investment. The intrastate, interindustry data measure the extent of tax-induced distortions (inequalities) under a single state-local tax structure. The variability of intrastate, interindustry tax burden differentials is measured by the standard deviations of the ATRR.

Table 4 Comparative After-Tax Rates of Return (ATRR) on New Investment by State and Industry (in percent)

Industry and SIC code	Illinois		Indiana		Michigan		Minnesota		Ohio		Wisconsin		Region	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	Mean (7)	Stdv (8)
Manufacturing														
Food and kindred (20)	12.165 (12)	12.015 (8)	12.521 (6)	12.433 (9)	12.289 (5)	12.031 (12)	12.242	0.209						
Apparel and other textile (23)	12.148 (14)	11.800 (14)	12.483 (7)	12.468 (7)	11.983 (14)	12.017 (13)	12.150	0.276						
Lumber and wood (24)	12.247 (5)	12.060 (3)	12.342 (14)	12.217 (14)	12.225 (9)	12.044 (10)	12.189	0.115						
Furniture and fixtures (25)	12.240 (6)	11.953 (11)	12.481 (8)	12.378 (12)	12.122 (12)	12.070 (6)	12.207	0.198						
Printing and publishing (27)	12.171 (11)	12.057 (4)	12.524 (4)	12.416 (11)	12.348 (3)	12.033 (11)	12.258	0.201						
Chemicals and allied (28)	12.174 (10)	12.020 (7)	12.541 (3)	12.474 (5)	12.292 (4)	12.051 (8)	12.259	0.217						
Fabricated metal (34)	12.202 (7)	12.010 (9)	12.397 (12)	12.473 (6)	12.261 (7)	12.068 (7)	12.235	0.181						
Machinery, except electrical (35)	12.202 (8)	12.008 (10)	12.382 (13)	12.496 (4)	12.252 (8)	12.075 (5)	12.236	0.183						
Electrical and electronic equipment (36)	12.313 (2)	12.054 (5)	12.462 (9)	12.793 (1)	12.284 (6)	12.229 (1)	12.356	0.252						
Motor vehicles and equipment (37)	12.370 (1)	12.021 (6)	12.459 (10)	12.630 (3)	12.145 (11)	12.228 (2)	12.309	0.221						
Instruments and related (38)	12.150 (13)	11.952 (12)	12.522 (5)	12.423 (10)	12.205 (10)	12.014 (14)	12.211	0.224						
Transportation, Communication & Public Utilities (48)	12.312 (3)	12.196 (1)	12.429 (11)	12.316 (13)	12.386 (2)	12.125 (4)	12.294	0.115						
Retail														
General merchandise (53)	12.189 (9)	11.834 (13)	12.661 (1)	12.441 (8)	11.984 (13)	12.047 (9)	12.193	0.308						
Services														
Business (73)	12.304 (4)	12.145 (2)	12.641 (2)	12.753 (2)	12.437 (1)	12.216 (3)	12.416	0.241						
Mean	12.272	12.028	12.520	12.507	12.228	12.128								
Standard Deviation	0.089	0.127	0.094	0.172	0.148	0.098								

Note: New investment undertaken at the home site. Industry rankings within each state appear in parentheses. Source: 1996 AFTAX file.

Perhaps the most obvious conclusion to be drawn from the baseline simulations is that within each of the Great Lakes states there is a relatively high degree of tax equality among the various industry types: the standard deviation for each of the states is less than one. This result is especially interesting given the industry differences in the ratio of capital to total assets and the composition of that capital. For example, machinery and equipment comprise about 94% of depreciable investment in typical electrical and electronic equipment manufacturers (SIC 36) but only 36% for firms in furniture and fixtures (SIC 25). The smallest interindustry variations are in Illinois, where the percentage difference between the highest ATRR (SIC 37) and the lowest (SIC 23) is less than 2%. The largest intrastate variability occurs in Minnesota.

The second observation is the similarity in relative tax burdens by industry across the six states. The standard deviation for all the selected industries in the Great Lakes states is 0.210. Given the diversity in firm asset composition and in the components and provisions of the business tax structures among the six states (in particular, the treatment of equipment and inventories), the interstate, interindustry difference between the highest ATRR (Minnesota: SIC 36) and the lowest ATRR (Indiana: SIC 23) is 0.993 percentage points or 7.8%. Column 8 in table 4 gives the variance in the interstate pattern of ATRR by industry for the six states combined. These are marginally larger than their intrastate counterparts, but they still indicate a relatively level tax-playing field for new in-state capital investment in the region. Informal tax coordination and/or collaboration is implied, the result of competitive emulation and defensive strategies to retain domestic investment. The new global competitive economic realities preclude totally independent subnational business tax policy. The regional data also indicate that the highest taxes are imposed on corporations providing business services, followed by manufacturers of electronic equipment and motor vehicles.

Although the overall impression of the data in table 4 is one of approximate uniformity and consistency, it is a mistake to assume that new investors are indifferent to the choice of locations within the Great Lakes region. Table 5 ranks the states by industry type on the basis of ATRR levels. Figure 1 graphically presents the same data indexed against the regional averages. No state has perfect consistency in its domestic ATRR rankings across the region. Michigan has nine first-rank (highest ATRR) positions among the 14 industry types and Minnesota five. Indiana has the highest tax burdens (lowest ATRR) in 12 of the 14 industries, and Wisconsin has the highest tax burden in the remaining two industries. Ohio and Illinois alternate ranking positions among industry types in the middle range.

Differentials in tax costs (and nontax costs) are likely to be smaller if the comparison base is intraregional than if it spans wide and diverse geographical areas (e.g., Illinois versus California). Governments are faced with many of the same costs as private firms (e.g., wages and utilities) and these costs and service requirements tend to be more uniform within regions. Climate and topography are generally more similar as well within regional boundaries.

Reinforcing the competition-induced tax coordination is the leveling influence of the deductibility of state and local business tax payments for purposes of computing federal income tax. Under current provisions, federal tax liability varies inversely and proportionately with the amount of state-local business taxes paid. The federal tax offset reduces both the absolute burden of subnational business taxation and narrows the differences in tax bills within and among the states. Consider two corporations

Table 5 Comparative After-Tax Rates of Return (ATRR) on New Investment:
State Ranking by Industry

Rank	Industry (SIC Code)													
	20	23	24	25	27	28	34	35	36	37	38	48	53	73
1	MI	MI	MI	MI	MI	MI	MN	MN	MN	MN	MI	MI	MI	MN
2	MN	MN	IL	MN	MN	MN	MI	MI	MI	MI	MN	OH	MN	MI
3	OH	WI	OH	IL	OH	OH	OH	OH	IL	WI	OH	MN	WI	OH
4	IL	OH	MN	OH	IL	IL	IL	IL	OH	OH	IL	IL	OH	IL
5	WI	IL	WI	WI	IN	WI	WI	WI	WI	IL	WI	IN	IL	WI
6	IN	IN	IN	IN	WI	IN	IN	IN	IN	IN	IN	WI	IN	IN

Note: 1=highest ATRR.
Source: Table 4

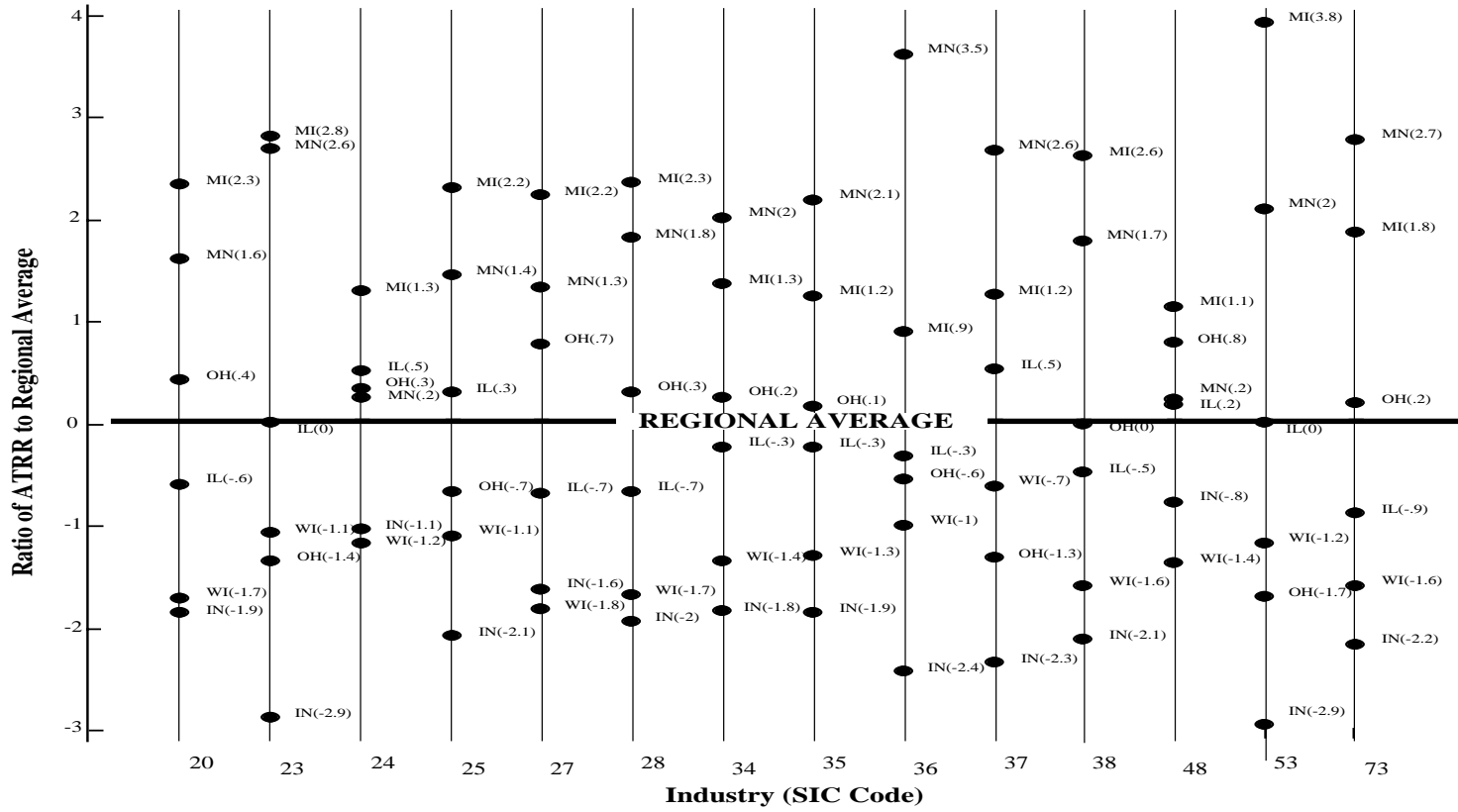
subject to the maximum 35% federal corporate income marginal tax rate, one in state A paying \$20,000 in state and local taxes and the other in state B paying \$10,000 in state and local taxes: a \$10,000 difference. After taking federal deductibility into account, the net cost of the subnational taxes is \$13,000 in state A and \$6,500 in state B. The difference in tax payments between state A and state B is reduced to \$6,500 (\$13,000–\$6,500) from \$10,000 (\$20,000–\$10,000).⁷

6.2 Baseline Simulations: State-Local Taxes Only

From the point of view of an investment decision, the total ATRR on an incremental investment is undoubtedly more meaningful than a separate state and local tax measure. But because federal taxes are locationally neutral with respect to investment within the U.S., altering interjurisdictional tax burden differentials is a subnational government responsibility. To estimate the relative magnitudes of subnational business tax differentials separately, the set of ATRR in table 4 is decomposed by calculating the incremental net profits that would prevail in the absence of the federal corporation income tax. In this case, the federal corporate income tax rate is set to zero. Table 6 presents these simulation results. The assumptions underlying these calculations are identical in every respect to the total incremental tax burden computations in table 4 except for the exclusion of the tax imposed by the federal government on the return to corporate capital and, consequently, the elimination of the provision for the deductibility of state and local tax payments. The results also approximate the probable distributional pattern of state-local business taxation under the several recent proposals for repeal of the federal corporate income tax and imposition of a comprehensive consumption-based tax system. All proposals disallow the current deduction for income and property taxes paid and provide for the immediate expensing of capital asset acquisitions, thereby effectively removing any federal tax from the return to capital.

In the base case, the Illinois manufacturer of motor vehicles and equipment (SIC 37) receives an ATRR from new in-state capital investment of 12.37%. Absent the federal corporation income tax, the ATRR increases by 49% to 18.43% on the same investment. In other words, Illinois state and local taxes explain approximately 21%, or about one-fifth, of the firm's total incremental tax cost and the federal corporation income tax, some 79%. From this perspective, federal taxes are predominant, but

Figure 1 Comparative ATRR on New Investment by Industry Relative to the Regional Average



Source: Table 4.

Table 6 Comparative After-Tax Rates of Return (ATRR) on New Investment by State and Industry with No Federal Income Tax (in percent)

Industry and SIC code	Illinois (1)	Indiana (2)	Michigan (3)	Minnesota (4)	Ohio (5)	Wisconsin (6)	Region Mean (7)	Stdv (8)
Manufacturing								
Food and kindred (20)	18.478	17.955	18.945	18.757	18.524	18.213	18.479	0.358
Apparel and other textile (23)	18.314	17.766	18.657	18.699	18.010	18.059	18.251	0.374
Lumber and wood (24)	18.519	18.138	18.526	18.254	18.533	18.148	18.353	0.194
Furniture and fixtures (25)	18.288	17.868	18.658	18.390	18.126	18.026	18.226	0.281
Printing and publishing (27)	18.395	18.152	18.918	18.672	18.680	18.189	18.501	0.305
Chemicals and allied (28)	18.374	17.970	18.993	18.817	18.545	18.215	18.486	0.380
Fabricated metal (34)	18.381	18.103	18.683	18.692	18.488	18.174	18.420	0.249
Machinery, except electrical (35)	18.417	17.950	18.491	18.828	18.475	18.221	18.397	0.294
Electrical and electronic equipment (36)	18.565	18.189	18.777	19.201	18.528	18.438	18.616	0.344
Motor vehicles and equipment (37)	18.430	17.924	18.566	18.717	18.100	18.214	18.325	0.299
Instruments and related (38)	18.388	18.099	18.939	18.703	18.486	18.177	18.465	0.318
Transportation, Communication & Public Utilities (48)	18.748	18.531	18.739	18.559	18.811	18.404	18.632	0.158
Retail								
General merchandise (53)	18.363	17.836	19.064	18.644	18.070	18.144	18.354	0.443
Services								
Business (73)	18.517	18.290	19.007	19.102	18.728	18.383	18.671	0.333
Mean	18.433	18.023	18.768	18.698	18.351	18.200		
Standard Deviation	0.105	0.174	0.198	0.250	0.214	0.123		

Note: New investment undertaken at the homesite.
Source: 1996 AFTAX file.

state and local tax costs are decidedly not trivial in the investment decision process. It is clear from the industry standard deviations that without the leveling influence of the current federal deductibility provision, interstate differences in state-local tax costs would increase and have potentially more significant impact on investment location. The proposals to eliminate the deductibility of state-local taxes from the federal tax calculation would generate a strong incentive for new investment to locate in states with low business taxes and to avoid those states with high taxes, other things equal. The likely outcome of this locational incentive effect would be to fuel the already raging fires of interstate tax competition and drive business taxes (and revenues) down to the lowest common levels.⁸

6.3 The Pattern of ATRR from Cross-Border Investment Flows

While home state expansion normally represents the largest proportion of new investment, cross-border capital flows are increasingly important. Many corporations are confronted with a variety of geographical choices for their operations and plant expansions. The investment decision is undertaken in anticipation of profit and focuses on relative profit opportunities. Thus, the opportunity cost of an investment at one location is the return forgone from investing elsewhere. Stated alternatively, the decision to invest at a particular site depends not only on the prospective after-tax return at that site but upon the expected profits available at alternative locations. The final set of AFTAX simulations addresses the issue: Is it more profitable, taxwise, to initiate or expand investment at the homesite or at other locations in the Great Lakes states?

The number of possible combinations and permutations of firms and cross-border locations is virtually infinite. Because the purpose here is to demonstrate the impact of the interaction of subnational business tax systems, a sample of simulations illustrates the complexity and potential magnitude of cross-border capital flows. Table 7 contains the estimates of cross-border ATRR for representative corporations engaged in the manufacture of instruments and related products (SIC 38). It also shows the percentage differences in post-tax profit rates between an expansion at the parent site and an expansion to another state within the Great Lakes region.

The translation of the simulation results in table 7 can be illustrated by examples. An instrument manufacturer currently domiciled in Illinois contemplates an expansion of its operations at either its present Illinois location or at sites in Indiana and Michigan. The firm's baseline or "hurdle" ATRR is 12.15% (table 4). As long as the incremental investment yields as much or more at the homesite than an identical investment at the alternative out-of-state locations, the firm will expand in Illinois. The identical investment at the Indiana and Michigan sites generates ATRR of 11.62% and 13.81%, respectively. Based on the comparative analysis, the firm expands its operations at the Michigan location because its profits there are greatest. The identical firm domiciled in Indiana and confronted with the same location choices also expands in Michigan, where it increases its after-tax profits by some 16.65%.

In both scenarios, the firm's "hurdle" rate is the ATRR at its homesite. In an open, competitive economy with unrestricted capital mobility, the home state is the "defender" and the alternative locations are the "challengers." If all other things are equal (and they seldom are), and a challenger provides a higher profit than the de-

fender, the challenger wins the “prize.” Alternatively, if the incremental investment at a challenger site does not provide a rate of return greater than the defender, expansion occurs at the homesite. This is precisely the competitive environment that prompts many state and local officials and tax policymakers to offer to match or better any tax-cost differential between locations.⁹ It is particularly prominent within regions where, typically, differentials in nontax costs (wage rates, energy bills, and the like) differentials are smaller and tax considerations consequently take on more significance.

The simulation results provided in table 7 disclose some seemingly inconsistent patterns. For example, the firm domiciled in Michigan decreases its profits by 16% in an expansion to Ohio, but the identically situated Ohio-based firm also records decreases in its rate of return in an expansion to Michigan. Similarly, the domestic Minnesota company finds expanding into Wisconsin decidedly unattractive; but, by the same token, the Wisconsin cohort finds the Minnesota investment unattractive. The explanation for these seemingly paradoxical results lies in the interactions of the state corporation income tax apportionment formulas at the respective homesites and expansion sites, particularly the provisions in these formulas for the treatment of sales to out-of-state taxing and nontaxing jurisdictions (i.e., the “throwback” provision¹⁰). When the parent firm expands at the homesite, the same percentage of the enlarged firm’s profit is taxed as before expansion. When expansion takes place at an out-of-state location, however, a larger proportion of the combined total income of the expanded firm may be taxed by the two states.

To illustrate, recall that the simulations here assume that the parent firm expands its plant at another Great Lakes location in which it is already selling some percentage of its output. It is not previously subject to taxation at this out-of-state site because it does not have the requisite nexus (i.e., no production facilities). After expansion in the previously untaxed location, the expansion state now has jurisdiction to tax some percentage of the firm’s total income. The size of this increase depends entirely upon the percentage of sales in the expansion state before and after expansion. Because Ohio and Minnesota do not require the throwback of sales to nontaxing jurisdictions, under the baseline 10/80/10 sales destination assumption, only 55% and 37%, respectively, of the income from new home state investments are subject to taxation. The homesite advantages of this apportionment formula provision (and in the case of Minnesota the 15-15-70 weighting scheme) more than offset any statutory tax rate differentials and definitions of taxable income. In a word, Michigan may be attractive to firms from Illinois and Indiana because it has lower tax rates and all three states have essentially the same apportionment provisions. But when compared to the domestic investment environment for similarly situated Ohio firms, Michigan comes out second best. The same holds for the Minnesota/Wisconsin cross-border investment flows.

The foregoing points up some of the hazards of making generalized interjurisdictional tax differential comparisons of multistate firms. A firm’s tax cost reflects its particular set of operational parameters (i.e., plant locations, sales, assets, and the like) interacting with the tax laws and provisions in any one or several of the locations at which business activities are conducted.

Table 7 Comparative After-Tax Rates of Return (ATRR) on Selected Cross-Border Investment, Great Lakes States

SIC 38: Manufacturer of Instruments and Related Products		Percent Difference In-State v. Out-of-State Expansion	
Homesite	Expansion Site	ATRR (1)	(2)
Illinois	Indiana	11.620	-4.36
Illinois	Michigan	13.811	13.67
Indiana	Illinois	12.335	3.21
Indiana	Michigan	13.942	16.65
Ohio	Michigan	11.702	-4.12
Michigan	Indiana	10.308	-17.68
Michigan	Illinois	10.860	-13.27
Michigan	Ohio	10.545	-15.78
Minnesota	Wisconsin	9.650	-22.32
Wisconsin	Minnesota	11.146	-7.22

Note: Positive number in column (2) indicate higher ATRR from out-of-state expansion; negative number the reverse.
Source: 1996 AFTAX file.

One clear implication of the cross-border simulations is that the magnitude of differential ATRR can be quantitatively significant. Whether multistate and/or multinational firms respond to tax differentials and investment tax incentives is a separate empirical research question. Recent studies and ample anecdotal evidence offer some support that they do. (See, for example, Bartik, 1991, 1994; L. Papke, 1991; Rickman et al, 1993; Tannenwald and Kendrick, 1994.) Most estimates of the responsiveness (elasticity) of investment with respect to tax differentials range from -0.5 to -1.8 depending upon the industry type; that is, if the ATRR increases, say, by 10% (or decreases in competing sites by 10%), or increases from 10% to 11%, investment will increase between 5 and 18%.

In an open, competitive economy with virtually perfect capital mobility, differential taxation may make a difference in the geographical allocation of capital investment. This is precisely the perceived relationship that is prompting subnational policymakers to offer firm-specific tax incentives to attract and/or retain investment. Absent an enforceable noncompete agreement, tax-induced competition is a fact of life that over time will undermine the ability of subnational governments to tax mobile capital.

7 Tax Differentials and Economic Growth Rates

No attempt is made here to incorporate the ATRR differentials into an econometric model relating business taxation, investment behavior, and economic growth. Nevertheless, it is interesting to compare several summary measures of economic growth rates with the findings of this paper. Table 8 provides a composite, 14-industry ATRR for each state in the Great Lakes region. Included with this ratio are the annual average growth rates of per capita GSP, per capita personal income (both in constant dollars), and nonagricultural employment.

It should be noted that the time-frames of the economic growth measures do not coincide precisely with those of the simulation results. For purposes here, however, the assumption of relative stability in tax differentials over short periods of time is plausible, given that the inertial tendency of subnational business tax policy generally reflects long-standing economic and political constraints and institutions.

The results of the summary comparisons in table 8 are puzzling. If states are ranked by their average annual growth rate in per capita GSP, Indiana ranks at the top of the ordering followed by Minnesota, Illinois, Michigan, Ohio, and Wisconsin. Indiana is also ranked second on the basis of the per capita personal income and employment growth measures. It will be recalled that in the majority of simulations, Indiana recorded the lowest ATRR (highest tax costs) among the six states included in the comparative analysis. Similarly, Michigan has generally the highest ATRR (lowest tax costs) but is ranked fourth on the basis of two of the three indices of economic growth.

What do the data in table 8 disclose about the relationship between state-local tax differentials and the level of economic activity? Can the correlation between economic growth and relative business tax burdens be exploited by public policy? It should first be emphasized that the linkage between taxes and growth rates implied by these data is not causal. Saying that “high Indiana business taxes encourage growth” makes no more sense than saying “low Michigan business taxes impede growth.” Tax policy is only one of the determinants of capital investment and it has a minor role in affecting the rate of economic growth. The correlations do not prove that high tax

Table 8 Comparative After-Tax Rates of Return (ATRR) with Alternative Measures of Economy Growth Rates (in percent)

	Illinois	Indiana	Michigan	Minnesota	Ohio	Wisconsin	Region
Average Annual Growth of Per Capita GSP in Constant Dollars (1982-1992)	6.06 (3)	6.33(1)	6.00 (4)	6.24 (2)	5.81 (5)	5.78 (6)	5.99
Average Annual Growth of Nonfarm Employment (1982-1994)	1.71 (6)	2.73(2)	2.56 (4)	2.82 (1)	1.96 (5)	2.62 (3)	2.40
Average Annual Growth of Per Capita Personal Income in Constant Dollars	1.72 (4)	1.98(2)	2.11 (1)	1.81 (3)	1.72 (4)	1.61 (6)	1.79
All-Industry After-Tax Rate of Return (1996)	12.26 (3)	11.90(6)	12.56 (1)	12.53 (2)	12.25 (4)	12.12 (5)	12.27

Note: Rank order appears in parentheses.
Source: 1996 AFTAX file. GSP data from U.S. Department of Commerce, Bureau of Economic Analysis, 1982-1992. Per capita personal income from U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business, selected years. Employment data from U.S. Department of Commerce, Bureau of the Census, County Business Patterns, selected years.

costs promote economic growth or impede it. It is possible that low-growth states have reacted to their lagging economies by routinely providing investment tax incentives that are reflected in overall higher profit rates. It is also possible that high business taxes support an economic development infrastructure and micro tax-incentive strategy conducive to attracting growth-enhancing investment. Indiana arguably, and perhaps necessarily, has the most aggressive economic development program among the Great Lakes states. Comparatively high economic growth rates and high taxes on capital investment may also imply that capital-based taxes are less distortionary than alternative sources of revenue or that the growth consequences of tax differentials are zero or close to it. Finally, firms may have adjusted to the interstate tax differentials via capitalized nontax costs (e.g., in the price of land and/or labor). In a word, the data provided here are challenging precisely because they suggest a variety of possible explanations and hypotheses, some of which merit special attention as pointers to future research opportunities.

8 Conclusions and Future Research Agenda

In the U.S. today there is a strong current of popular opinion that holds that differential levels of subnational business taxation explain the success or failure of states to achieve appropriate rates of economic growth. Although the state and local tax laws examined in this paper are far from uniform in their application to various business types, the intraregional tax-cost differentials imposed on domestic companies by these diverse systems are relatively small. The evidence suggests that the competition for capital investment, at least among neighboring states, is not translated into significant differences in general business tax levels. The absence of divergence is attributable to fiscal emulation for the retention of domestic firms among similarly situated states and the leveling effect of the federal tax deductibility of subnational business tax payments. The federal tax offset is critically important for mitigating interjurisdictional tax differentials.

The ATRR on an incremental investment is the relevant standard for the measurement of incentive effects of subnational tax-cost differentials. It captures the combined weight and interrelationships of federal, state, and local taxes on capital income within the context of the investment decision process. The results of the AFTAX simulations cast doubt upon the proposition that firm-specific tax incentives can have a decisive impact upon capital investment decisions independent of the overall business tax system. A special abatement for personal property taxes in Indiana, for example, is the equivalent of a standard provision of the basic tax structure of Illinois, Minnesota, and Wisconsin. Further, the routine and ad hoc practice of granting tax concessions to attract investment may only serve to disguise the inherent deficiencies of a tax system and the need for basic tax reform. The study confirms that the post-tax return on new investment and state tax rankings are as much a function of firm-specific operating characteristics and the composition of a firm's capital portfolio as of statutory tax provisions.

It should be emphasized that the present paper is a descriptive comparison of competitive state-local tax systems. It does not attempt to measure or evaluate the relationship between subnational business taxation and investment location decisions.

Although there is no clear answer to the question of whether state and local taxes significantly impact investment location, there is a large and growing amount of econometric literature in support of a range of estimated elasticity coefficients of investment and employment change to tax differentials across jurisdictions over time.

It should also be specifically stated that the paper does not address the competitiveness of the states/sites examined for factors other than taxes. Certain locations may be more attractive than others despite comparatively high levels of business taxation. Higher taxes may be associated with higher levels of public services especially valuable to the business community. Plant site availability and cost, transportation facilities, the availability of skilled and unskilled labor, and the regulatory environment are just some of the other myriad factors that are considered in an investment location decision. All these considerations, and others, are held constant here so that the tax factor can be isolated and examined alone. A particular location for a new facility is selected only after an analysis of total costs. The importance of business taxation in the site selection equation is determined by the relationship between the magnitude of the tax differentials and the magnitudes of the differentials for other cost factors. If labor cost differentials are greater than tax cost differentials, then, by definition, labor costs are more important than taxes in location decisions. It is the total set of comparisons that is important, and it will be different for each business enterprise. The only way, therefore, to compare interjurisdictional tax differentials and establish state tax rankings is by reference to a particular firm or similarly situated group of firms.

What are the answers to the questions posed at the beginning of the paper: How do business taxes compare among the Great Lakes states? Are they competitive?

- For domestic firms located predominately in a single Great Lakes state and expanding their operations in that state, the region provides a comparatively level and competitive tax-playing field for new investment. Michigan and Minnesota domestic firms, on balance, do slightly better than Illinois and Ohio firms, but the differences do not appear to be locationally significant given the high transactions cost of relocation. Indiana and Wisconsin firms record the highest taxes on their homesite investments.
- For multistate corporations investing outside the parent state, the intraregional ranking results are less clear and are, in some cases, inconclusive. While Michigan appears to have a competitive advantage for cross-border investments within the region, the rankings of the states depend critically on particular firm's operating endowment and the direction of its cross-border investment flows.

The conclusions of this paper speak to a number of directions for future research. The tax differentials measured here are limited both spatially and by firm types. A more extensive modeling of firms by type and asset size would enhance the applicability and interpretation of the results. An expanded research agenda would also investigate whether the taxes imposed by the states in the Great Lakes region are competitive with other selected states in other regions of the country (e.g., the Southeast). Finally, the method of analysis adopted for the present paper also offers the opportunity to quantify the origins of interjurisdictional business tax differentials and compare them to such other intraregional and interregional nontax factors as labor and energy costs. It would, in effect, address the question of where we stand on business location factors other than taxes.

Footnotes

- ¹ The term *tax burden* is used as a synonym for *tax costs*, *tax liability*, or *taxes paid*. It is not meant to imply that taxes impose some special type of burden different from other charges or prices paid by business taxpayers.
- ² See, for example, Hall and Jorgenson (1967) and King and Fullerton (1984).
- ³ The balance sheet and income statement data are derived from the U.S. Department of the Treasury (1995).
- ⁴ A full listing of the tax provisions employed in this paper are contained in J. Papke (1995, 1996).
- ⁵ Sites within each state were selected on the basis of their rate of growth in employment. While investment data are preferable, they are not available. A detailed description of the selection process is contained in J. Papke (1995).
- ⁶ A more detailed discussion of the AFTAX applications and assumptions is contained in J. Papke (1995).
- ⁷ It should be mentioned that all business-related nontax costs are also deductible in determining federal corporate income tax liability. The only differential effect of deductibility is to reduce the importance of cost factors relative to noncost considerations, such as climate and geography.
- ⁸ For more on this issue, see J. Papke (1996).
- ⁹ The 1992 Arlington, Texas/Ypsilanti, Michigan bidding war for retention of a GM assembly plant is a case in point. Then-Governor Ann Richards was reported to have made an offer to GM "it could not refuse"; Michigan Governor John Engler, in turn, countered by promising to "match anything Texas offers" (Hayes, 1992).
- ¹⁰ The throwback provision is adopted by some states that normally apportion sales on a destination basis under which sales are entered into the numerator of the apportionment formula if they have a destination in that state. If sales are destined for a state in which they are not taxable, however, the throwback provision provides that such sales will also be placed in the numerator of the origin state's apportionment formula. Among the states included in the comparative analysis here, only Minnesota and Ohio do not have the throwback provision in their corporate tax structures.

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