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OPTIMAL STATE TAX DESIGN

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ABSTRACT

OPTIMAL STATE TAX DESIGN

By

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In this thesis, I attempt to identify the role of economics in state tax design. There are two decisions involved when choosing the appropriate tax structure, the amount of state government expenditures and the composition of revenues to finance those expenditures. A sequential decision making process is assumed as an approximation to reality.

Applying a monopoly bureaucrat model to the revenue decision, a state public official chooses the optimal tax mix as a function of spending, by minimizing the costs to the state of raising a certain amount of revenue. Costs include the residential burden costs net of exporting, any excess burden, and the administrative and compliance costs of a given tax structure. Given this resulting relationship between tax shares and government spending, the median voter chooses the median desired level of government expenditures. Consequently, this defines the specific pattern of tax shares.

The theory is tested by identifying the reduced form determinants of these factors, and estimating their effects

on a state's chosen tax structure directly, using a cross sectional approach of actual state tax shares. This estimation finds that the spatial shifting of taxes among states to nonresident factor owners and consumers and federal deductibility provisions for certain state taxes are significant factors explaining the existing revenue structures. State taxes are substitutes for each other on the basis of their exporting potential. From the state's point of view, the results suggest the role of economics in defining a "good" state tax structure.

For policy purposes, the results imply that when evaluating the effects of federal tax reform, a state's response to the elimination of federal deductibility of certain state and local taxes includes an adjustment in their tax structure, as those taxes become a more costly source of revenue. This response must be recognized in order for any evaluation to be accurate.

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CHAPTER 1

INTRODUCTION

In the past, research concerned with the exportation of state and local taxes tended to focus on the implied expenditure effects of this shifting across jurisdictions. Exporting through federal income tax provisions for the deductibility of certain state and local taxes provides a general stimulus to subnational government spending. Essentially, it becomes an indirect subsidy to state and local governments as it reduces the net price of public services. Similarly, exporting of taxes through the interstate movement of individuals, goods, or factors results in a net reduction in the relative price of public goods. The estimation of both of these influences on total spending has received considerable attention in the literature at both the state and metropolitan level.

But the shifting of state and local taxes to nonresidents not only affects the overall level of taxing and spending, it also influences the state and local tax system chosen. For example, federal deductibility is thought to produce a bias in favor of both the adoption of state income taxes over sales taxes and progressive rather

than proportional income taxes. Itemizers benefit from the federal offset in direct proportion to their federal marginal income tax rate. Because higher income taxpayers face higher federal marginal tax rates and are more likely to itemize than lower income taxpayers, this federal offset will be greater, the more progressive the state tax. Deductibility makes existing taxes less progressive, but if it also produces this bias in favor of a more progressive tax structure, the net effect on a state's equity profile becomes ambiguous.

Previous studies have offered descriptive analyses of the effects of tax exporting on a chosen revenue structure, but few have modeled this influence economically in an attempt to measure its significance. It is only recently, with the current drive for federal tax reform, that economists have seriously addressed this issue. Most of the work has been done at the local rather than state level, and most has focused on the revenue side of the fiscal process only, ignoring the choice of optimal spending. The research has evolved from analyzing the implications of tax exporting for expenditures only, to studying the implications of this shifting for the structure of revenues only.

This dissertation attempts to bring both sides of the fiscal process together. By focusing on state government decisions, I investigate the implications of tax exporting for desired state spending and the resulting tax mix chosen

to finance that spending. In this framework, I hope to contribute to the understanding of what constitutes a good state tax structure.

The main purpose of this dissertation then, is to determine what economic factors are important in the state fiscal process. Specifically, what is the role of tax exporting? Does it influence the taxing and spending choices at the state level; or do state taxes evolve mainly based on past inertia, where historical, political, and legal factors dominate?

There are numerous individual state-by-state observations that imply that economic factors do matter. In a 1984 report, the Hawaii Tax Review Commission explicitly states:

> "Hawaii's taxes should be structured in such a way as to maximize the exporting of taxes consistent with constitutional criteria and other goals of the state."[1]

They are aware that under their present tax structure, they export approximately thirty percent of their taxes, with the majority shifted through their tourist trade. But state officials also realize that other states, such as Alaska, Nevada, Texas, and Wyoming, export their taxes to a comparable or even greater extent. Therefore, Hawaii's Tax Commission recommends structuring their state tax mix to increase its tax exporting.

West Virginia provides another example. The gross receipts tax in this state involves 26 classes of different

types of economic activity with 18 different tax rates. In 1984, these rates ranged from 0.27 percent on wholesaling and 0.55 percent on retailing to 3.5 percent on coal production and 8.63 percent on natural gas production.[2] The pattern seems obvious. Activities consumed domestically are taxed at relatively lower rates, while activities largely exported are taxed at much higher rates.

Severance taxes in the mineral rich states and the corporate license tax in Delaware also result in substantial exporting due to the high incidence of interstate activity or out-of-state ownership.[3] So there are many examples that suggest that exporting is important in optimal state tax design. And this leads to many unanswered questions.

Does the very progressive income tax structure levied in Minnesota imply that these state officials are aware of the net burden advantages of a progressive structure due to the federal offset, and therefore, deliberately structure their taxes in this manner? And what about interstate competition? Do states attempt to compete with one another on the basis of tax structure? If they do, is it on the basis of imitation or disparity?

This study is undertaken to investigate these state-by-state observations in theory and practice. Once the variables which influence the choice of taxes each state chooses to levy are identified, these other issues may be addressed. The results will suggest the role of

economics in optimal state tax design.

The main hypothesis to be tested in this dissertation is that state public officials, as monopoly bureaucrats, attempt to raise required revenues in the least costly manner. Net burden costs to the state's residents, transactions costs associated with administration and compliance, and excess burden costs all define total costs for a given tax source. A state bureaucrat chooses the optimal tax mix just as a multi-plant monopolist chooses the level of operation of different factories. By equating the marginal costs across all tax sources, the revenue structure is determined as a function of total spending.

State spending, on the other hand, is chosen in a median voter framework. Given the information on the tax structure relationship chosen by the state, individual voters determine their own tax prices and chose the desired level of expenditures. Once this is done, the resulting tax mix is ultimately determined.

This theory is tested using 1982 cross sectional data on actual state tax shares. By focusing only on the residential burden costs net of exporting, I estimate both the spending and financing decisions across states. These two choices are then combined to interpret the reduced form influence of tax exporting on a state's revenue mix. The findings of this work have important implications for current federal tax reform proposals.

An overview of the relevant literature on tax exporting

and its influence on state and local fiscal decisions is presented in Chapter II. Past work has given considerable attention to the descriptive analysis of tax exporting across states, but very little work has surfaced of the possible influence of this shifting on a state's revenue mix.

State fiscal behavior is modeled sequentially in Chapter III, to approximate the simultaneous revenue and spending choice process. In this framework, both the state policymaker and the median voter are decisive.

Given this theoretical model, the empirical determinants of the potential to export taxes across states are identified in Chapter IV. A two-staged procedure is outlined which provides the basis for the ordinary least squares and two stage least squares estimation.

The results of the estimation are presented in Chapter V. In stage one, tax shares are chosen as a function of government spending. Stage two models the median voter's choice of desired state spending. Through the balanced budget constraint this defines the required level of revenues. These results are then combined and the final impact of exporting on a state's tax structure is calculated. The policy implications for federal tax reform are then suggested. As this research shows, tax exporting does play a role in defining optimal state taxing behavior.

CHAPTER 1

FOOTNOTES

[1] See Tax Review Commission, State of Hawaii, 1984, page 6.

[2] See Strauss, 1984.

[3] See Phares, 1980.

CHAPTER II

REVIEW OF LITERATURE ON EXPORTING AND TAX DESIGN

In this chapter I review the relevant literature on tax exporting and the influence of this exporting on state and local revenue decisions. Many theoretical and empirical studies have examined the extent to which taxes are shifted across regional boundaries. However, investigation of the possible effects of exporting on a chosen revenue mix has only recently been pursued. Both of these branches of inquiry provide a platform for the work that is carried out in later chapters.

The major research concerned with the influence of exporting on net tax prices is discussed in Section one. Through this analysis, the significance of tax shifting across jurisdictions is established.

The extensions of this work to state and local financing behavior are reviewed in Section two. The result that exporting is an important influence on the net price of public goods, and therefore, on the chosen level of public spending, suggests that it also is relevant for the choice of tax instruments used. Preliminary work supports this hypothesis.

The previous work that combines the influence of tax exporting on both the spending and financing behavior at the local level is outlined in Section three. This provides the basis for the general fiscal model of a state's political economy that is developed in later chapters. This chapter is then concluded with Section four.

2.1 EXPORTING AND NET TAX PRICES

McLure (1967) estimated tax export rates by states and by type of tax for 1962. He found that for most states, the export rates for any tax fell somewhere between 15 and 25 percent. Tax exporting lowers the cost of public services relative to privately provided goods, creating an incentive towards the relative overexpansion of the public sector across states.

But McLure also noted that because it seemed unlikely that state lawmakers knew exactly which taxes were most easily shifted, exportability did not appear to be a major determinant of state taxing behavior. Only those states with exceptionally high export rates seemed to deliberately rely on these taxes. For example, Delaware's largely exported corporate license tax and Nevada's tax on gambling activities both provide obvious sources on nonresident revenues. Similarly, taxes on mining, manufacturing, and railroads are important components of a state's tax system where these taxes are easily exported across state lines.

But even then, McLure argued that the possibility of base erosion in the long run deterred the intensive use of some taxes solely on the basis of exportability.

Therefore, no attempt was made at this time to estimate the effects of exporting on a state's tax structure. Very little research surfaced on the implications of tax shifting for a state's revenue mix, even though McLure admitted that some influence was evident. How extensive this influence was remained speculative. Instead, McLure's work led to an extensive body of literature on the theoretical and empirical estimation of the exporting and importing of taxes across states.

Phares (1980) extended McLure's research by estimating export rates on a tax-by-tax, state-by-state basis for 1976. He identified two basic sources of exporting, (1) price/migration exporting, which includes the interstate movement of taxed commodities or individuals and the shifting of taxes to nonresident factor owners or consumers, and (2) federal offset exporting, which occurs through federal provisions that allow for the deduction of certain state and local taxes in determining federal tax liability.

By adopting McLure's methodology for the price/migration effect, and using special IRS data for the federal offset component, Phares analyzed the net burden of each state and local tax by income class across all fifty states. He found that state corporate net income and

severance taxes exhibited the greatest propensity for exportability. The state individual income tax is also easily exported, mainly due to the federal offset provision. Phares' work provided a very thorough analysis of the importance of exporting and its influence on the net price of public goods.

Others carried this work even further. Mutti and Morgan (1983) focused on net tax exportation across all states for 1980, based on the direct exporting of general sales and excise taxes associated with travel, and on the indirect exporting of state and local taxes deductible against federal individual tax liabilities. This was done in a multilateral framework, developing a more complete empirical estimation of tax importing than was found in Phares.

Mutti and Morgan (1985) then extended this analysis to state corporate income and property taxes, measuring the net exporting of these taxes through federal deductibility provisions and through the shifting of these taxes back to nonresident capital owners. The potential for exporting severance taxes on energy resources was considered separately in Mutti and Morgan (1981). Special contractual arrangements, product market dominance, transportation costs, market structure, and public regulation all required this separate consideration. With these three studies, Mutti and Morgan established a complete analysis of state-by-state tax shifting.

2.2 EXPORTING AND TAX SHARES

Hogan and Shelton (1973) presented one of the first attempts to examine the effects of exporting on a state's tax structure. They modeled the state as a discriminating monopolist, striving to maximize the tax revenue contributed by nonresidents. Using McLure's 1967 export data, the authors calculated the Spearman rank order coefficients between export rates and the proportion of total state tax revenue collected by that particular tax. These correlation results supported their hypothesis. Specifically, the relationship was significantly positive for motor fuels, insurance, recreation, corporate income and franchise, and property taxes. Generally, these are taxes that exhibit relatively large differentials across states in the potential for exporting. They are also taxes whose bases are relatively insensitive to rate changes.

Hogan and Shelton also used Spearman rank order coefficients to test whether a significant relationship existed between the proportion of total state tax revenues paid by nonresidents and the level of public goods provided by the state. Again, they found a significant positive correlation. A decline in the residential tax burden not only lowers taxes, it also increases state expenditures.

Sjoquist (1981) used a median voter framework to explain the tax composition of local governments. A local government has previously decided on the level of spending to be financed, so the relevant decision for the median

voter is how to raise the required level of revenues. Literature explaining the level of expenditures assumed that the tax price was fixed. Now the tax price is variable, while total spending is constant.

Using data on the 45 largest U. S. cities with a population less than two million, Sjoquist tried to explain the relative use of property taxes based on income characteristics and tax exporting. The results suggested that a relatively greater reliance on property taxes across localities is partly attributable to a higher level of desired spending, a smaller percentage of the population at the lower end of the income distribution, and a higher propensity to export property taxes.

This study represents the first real attempt at explaining the variation in the structure of taxes at the local level. It recognized that the composition of taxes responds to the same political and economic forces as expenditures. The biggest drawback to this approach is the separation of the taxing and spending decisions, assuming a constant level of expenditures. Essentially, both the median voter's tax price and the desired level of spending are determined simultaneously. Theoretically, these decisions must be modeled separately, but both sides of the choice process should be included. It may not be true that the dominant agent for choosing the tax mix is also the decisive voter for the spending choice, but because the level of taxes are explained by the same factors as the

level of expenditures, both choices become important.

Hettich and Winer (1984) also recognized that tax structures, both the shares and the structural features, arise endogenously. Modeling the revenue decision in a political framework, the authors hypothesized that state governments attempt to minimize the political costs of raising a given amount of revenue, where political costs are defined as the expected net loss in votes. They tested this hypothesis on 1976-1977 data by states, focusing on the share of income taxes in total tax receipts.

Following McLure's methodology, Hettich and Winer measured the potential to export taxes other than the income tax by calculating the share of a state's value added in manufacturing for national markets. The greater this share, the greater the potential to export these other taxes, and the less the state will use the individual income tax. They found a significant negative relationship between this variable and income tax shares across states.

As a measure of a state's potential to export income taxes, the authors calculated the proportion of state taxpayers with federal taxable income of $20,000 or more. The greater is this proportion, the greater is the proportion of itemizers for a given state, and the greater is the potential to export taxes through the federal offset. But this variable exhibited an insignificant negative relationship with income tax shares across states. From these results, the authors concluded that the federal

offset was not an important determinant of the political costs of state income taxation in contrast to the price/migration effect.

But again, as with Sjoquist, Hettich and Winer focused only on one side of the fiscal process, ignoring the spending decision. And they focused on only one tax, even though a change in the share of state individual income taxes in total tax receipts implies a corresponding change in the levels or shares of other taxes. A more complete model needs to be developed that combines both fiscal choices. And this model should be applied to the entire state tax structure.

2.3 A COMBINED FISCAL MODEL

Buchanan and Pauly (1970) recognized that removing the option for federal deductibility not only affects tax shares, but it also results in a readjustment of tax rates. Therefore, not only itemizers, but all taxpayers may be affected by this change. Flowers (1977) also noted that the choice of tax sources defines a single voter's tax share. Different tax sources may imply different individual tax shares, depending on the tax structure chosen. Zimmerman (1983) argued that the median voter's tax share is not constant over all levels of spending. As expenditures change, so does the median voter's tax burden. Therefore, desired state spending is chosen with the resulting share of taxes in mind. Tax exporting does seem

to affect the median voter's marginal tax price across states.

All of these articles suggest that not only does exporting influence the chosen revenue structure, but it also affects desired spending through this revenue response. As state tax shares change, corresponding changes in the tax base and rate definitions will influence the decisive voter's individual tax burden regardless of whether exporting affected this individual directly. Both the spending and financing choices should be included in a complete model of exporting and fiscal behavior.

Inman (1979) was the first to successfully combine both sides of the fiscal process. He examined the effects of three fiscal instruments available at the state or federal level for the reform of local tax structures: exogenous and matching aid, and regulatory standards. By characterizing the local government budgetary process as an "as if" maximization of a government official's preference function, the state and local official becomes a second player along with the utility maximizing resident voter in the game of state and local fiscal choice.

However, for both fiscal decisions, Inman identified the state public official (as a monopolistic bureaucrat) as the decisive economic agent. Therefore, he used mean rather than median data to estimate total taxes per capita across the 41 largest U. S. cities for fiscal year 1966-1967. Through the government budget constraint, this

defines total spending. Given this, Inman then allocated total taxes across individual tax sources by estimating the share of each tax in total tax revenues. His results for the share of taxes from the local property tax suggest that tax subsidies do affect local taxing behavior. The influence of the legal and political constraints, as well as the effects of the economic variables of income, federal aid, and tax burden prices were all included in this dual estimation.

Inman (1985) extended this model to examine the effects of proposed deductibility reform on the revenue decisions of these same 41 cities by estimating total taxes, and user fee and license revenues per resident. By allocating revenues as taxes per resident from the local property tax, and from each of the major local tax sources other than the property tax, Inman again found evidence linking local revenue and financing decisions to an estimate of the local average federal tax price. His results encourage further research in this direction.

Feldstein and Metcalf (1986) examined the effects of federal deductibility of state and local taxes on the fiscal behavior of state and local governments. Using individual tax return data for 1980, the authors constructed a set of instrumental variables for the federal tax price variable for itemizers and other taxpayers in each state, independent of state and local spending decisions. From this estimation, they found that

deductibility does influence both the state and local tax mix and the overall level of spending. Specifically, there is a greater reliance on deductible personal taxes (including income, sales, and property taxes) relative to all other state and local revenue sources in states where federal offset provisions imply a relatively lower cost of using these personal taxes. Therefore, eliminating deductibility may shift state and local financing structures away from personal taxes and towards business taxes and other revenue sources, with an overall decline in total spending.

The results reported in Feldstein and Metcalf's study support the role of tax exporting in the fiscal decisions of state and local governments in general, but a more disaggregated analysis of the responsiveness of alternative revenue sources would provide more accurate results. Taxes may be substitutes for each other, not only between deductible personal taxes and all other sources, but also between income, sales, property, and business taxes. This separation is essential for evaluating current federal tax reform proposals that eliminate the federal offset provision for certain state and local taxes.

2.4 CONCLUSION

As shown, much work has been done on the influence of exporting on net tax prices, at both the state and the local level. But very little research has been carried out

on the effects of tax shifting on a government's finance structure. There is a need for more work to be done on state and local tax design.

For a complete analysis, though, both the spending and taxing decisions should be modeled in a combined framework. Focusing on the revenue choice only, ignoring the implications for the corresponding level of spending, suggests that both of these decisions are disjoint. On the contrary, the determinants of the composition of tax receipts also influence total expenditures both directly and indirectly through the revenue mix response.

The literature reviewed in this chapter characterizes the evolution of the work on tax exporting and fiscal design, starting with McLure's initial study and proceeding to the present. The research presented in the following chapters attempts to carry this work one step further. Building from past results, the theoretical and empirical work in this thesis furthers the understanding of state fiscal behavior and raises new questions to pursue.

CHAPTER III

A THEORETICAL MODEL OF OPTIMAL STATE TAX DESIGN

A simple model that characterizes the economic influences on the decision making process of choosing the optimal state tax structure is developed in this chapter. The main purpose is to identify the economic factors that affect optimal state tax design. Therefore, I will be less concerned with specific functional forms, focusing instead on general relationships.

The underlying behavioral objectives that characterize a state's political economy are outlined in Section one. Specifically, the aggregate level of revenues (desired state expenditures) is not invariant to the alternative means of financing those expenditures. Likewise, the finance structure imposed depends on desired state spending.

This behavior is modeled theoretically in Section two by imposing a cost minimization scheme on the state public official to determine the state tax mix as a function of spending. Then a traditional median voter model will be developed to derive desired state spending as a function of the revenue structure equation. Given the nature of the

economic factors involved in this choice process, I will focus more on the identification of the determinants of this model and their hypothesized effects on the chosen tax mix, rather than the specific characterization and comparative statics involved. This is presented in Section three. These hypotheses are drawn together in a conclusion in Section four.

3.1 BEHAVIORAL OBJECTIVES

The behavioral model best suited to examine the choice of tax mix on the state level is one that combines the monopoly bureaucrat and median voter models of public choice. There are two decisions involved when choosing the appropriate tax structure. Required revenues are defined by the amount of government spending. Realistically, the fiscal process of determining state government expenditures, and the composition of revenues to finance those expenditures, is simultaneous. But a sequential decision making process is assumed as an approximation.

In previous work on the decision to tax at the local level, Sjoquist (1981) largely avoided the dual nature of this problem by assuming only one fiscal decision. The choice of revenue structure was modeled as a median voter decision, given a fixed level of government expenditures. Inman (1985) advanced the work on local financing behavior by applying his bureaucratic model to both sides of the choice process. The local public official first chooses

the desired level of government spending and then chooses the tax mix to finance this level. Budgetary totals are chosen first, then these totals are allocated across specific expenditure and finance instruments.

On the local level this process is justified. A locality is aware of property valuations within its district, so the public official is able to set taxes accordingly given required revenues. On the state level the reverse of this is true. Because budgetary totals tend to change more often, whereas the choice of taxing instruments does not, the optimal finance mix is decided first as a function of state spending. Given this revenue structure equation, the optimal level of government spending is then chosen. Essentially, desired expenditures are based on a given tax structure function.[1]

In the short run, there may be small marginal changes in the tax mix, but generally these are not continuous. As desired government expenditures increase, new taxes will be introduced only when the costs of increasing reliance on existing taxes are sufficiently large relative to the fixed costs of incorporating these new taxes into the current revenue structure.[2] In the long run, tax decisions are "lumpy;" they tend to be non-marginal. Because modeling these choices within an economic framework limits the theoretical analysis to marginal changes, an increased reliance on an existing tax is viewed as a marginal change in the rate structure or in the definition of a given tax

base such that the fraction of total tax revenue raised from that tax increases.[3] Levying a new tax is viewed as a marginal change from a zero tax rate to some positive level.

In the analysis that follows, I focus mainly on the composition of state revenues. A more complete model might extend this framework to include the structural features of specific taxes, such that rate schedules and taxable base definitions are endogenous.[4] I do not deal with this directly, noting instead that a desired change in the given tax mix implies some necessary change in the structural features of particular taxes. Only the direct effect on a state's relative use of revenue sources is modeled.

Specifically, I apply the monopoly bureaucrat model to the financing decision. State public officials choose the optimal tax mix as a function of public spending. They are in the best position to determine how to efficiently utilize their limited resource base. To some extent, this public official is motivated by self interest. But by choosing relative taxes in accordance with the economic and legal constraints involved, the official also attains his own goals. And because the decision of the amount of resources required, i.e., total government spending, is a decision controlled by the voting public, this desired level is chosen in a median voter framework, given the revenue structure decided upon by the state official.

How to raise needed revenues does not carry any

obligations as to how to use the tax revenues raised. Taxing does not necessarily imply the nature of spending on the state level. Likewise, the aggregate level of revenues required is not invariant with respect to the alternative means of raising those funds. A change in relative tax shares may change the relative prices of public and private goods.[5] In the median voter framework, this may affect the desired level of government expenditures. So the state monopoly model is used to determine tax shares as a function of state spending. As the median voter chooses optimal spending given this relative tax function, a specific pattern of revenues results.

Now that the appropriate behavioral objectives have been outlined, I can proceed to build the theoretical model to be used in identifying the economic factors that influence a state's optimal tax structure.

3.2 THEORETICAL CONSTRUCT

In previous optimal tax literature, a government chooses a specific set of taxes according to a given social welfare function.[6] Efficiency and equity are the goals, subject to a government revenue constraint and the individual conditions for utility maximization. If all individuals are identical, this translates directly into a problem of deadweight loss minimization. The public sector attempts to minimize the costs of taxation to individuals, subject to the requirement of raising the revenues needed

to provide some predetermined level of government expenditures.

In the model outlined here, a state public official does not know the amount of revenues required when choosing the tax structure. He knows that the budget must balance, but because he is not sure of the specific level of total expenditures, he is not certain of the exact level of total revenues required. The two decisions are modeled separately in order to capture the influence of the different economic agents dominant in each decision.

3.2.1 TAX STRUCTURE IN A MONOPOLY BUREAUCRAT MODEL

Following Inman, a state's financing decision is modeled as an "as if" maximization of a state official's preference function subject to the appropriate government budget constraints.[7] Preferences are assumed to be transitive, closed, and complete, satisfying the sufficient conditions for ordering.[8]

The arguments of this preference function are the costs to the state of raising a certain amount of revenues, C(.), and the level of state spending, E(.).[9] Because expenditures are determined in the median voter framework at the second stage of the model, this preference function is weakly separable between state spending and costs. It is essentially an implied social welfare function. Increases in state spending are socially preferred, with diminishing returns. Increases in the costs to the state of raising revenues through taxes and user charges are

socially harmful, with the harm increasing at an increasing rate.

Given that state spending is not a choice variable for the public official, this problem translates directly into one of cost minimization. The public official acts to minimize the costs of taxation as a function of state spending by choosing relative tax shares, $T_i / \sum_i T_i$, where T_i measures the tax revenues generated from tax i.

Assumptions

Several assumptions are applied at this stage to simplify the analysis. Initially, costs are defined only in efficiency terms. Equity concerns are not ignored, but instead are just defined over the whole revenue structure. It is the overall progressivity of the tax system that matters. The public official can always adjust the overall progressivity, therefore, equity does not enter into the individual tax choice. Later, this assumption will be relaxed, and equity will also affect a state's tax mix.

Second, only non-debt current state revenues are included in $\sum_i T_i$. This involves revenues from taxes and user charges, but excludes debt finances.[10] Third, the federal marginal tax rate, v, is assumed to be constant. Through federal deductibility of state and local taxes, itemizing individuals export a share of these taxes in direct proportion to v. But as calculated alone, this initial level of tax exportation overstates the extent of net tax exportation. If the federal government responds to

this loss of tax revenues by increasing federal personal income tax rates, then some tax importation may occur depending on the average marginal federal tax rates and the average effective state tax rates in a given state. If instead, the federal government responds by reducing government services, again costs are imposed on residents outside of the state levying the deductible tax.[11] By assuming constant federal marginal tax rates, this importing effect is initially eliminated.

The fourth assumption employed is that of independent demand curves. This limits the analysis to a partial equilibrium framework by eliminating cross price effects. A related assumption is one that imposes independence on the relevant tax bases. For example, as sales increase within a state through resident or nonresident purchases, state sales tax revenues rise. But state income tax revenues may also increase as resident incomes respond to the sales climb. Independent tax bases eliminates this situation. Essentially, $C(T_i / \sum_i T_i)$ is additively separable in T_i and $\sum_i T_i$,

$$C(T_i / \sum_i T_i) = \sum_i C_i (T_i / \sum_i T_i) \qquad (3.1)$$

The marginal costs associated with each tax, i, are independent across tax sources.[12]

Finally, interstate competition is initially ignored. Tax share differentials across states may induce resource migration across state lines. Therefore, the tax mix of those states that are in competition with this state,

either directly or indirectly, should be included in the optimal tax structure choice in that state. If this were included, the model would be defined in general equilibrium terms across states, with an appropriate behavioral assumption characterizing the expected actions of these other states. State A's choice of tax shares would not only be a function of internal factors, but also of the external tax structures of any state that is competing with this state on some level.

The major problem that exists in defining interstate competition is defining on what level states compete. Surrounding states may be rivals, but not all borders are competitively linked. Do states compete within regions, or do they compete across regional boundaries? And competition is not only limited to contiguous borders. States may be linked commercially, geographically, or by some other definition. These factors involved in defining rival states need to be identified at some preliminary level before interstate competition can be included. So for initial simplicity, this competition is ignored. This assumption will be relaxed at a later stage of the analysis, as some of these factors of competition are identified.

Model Specification

In defining the costs to the state of various tax instruments, three elements can be identified. The withdrawal of resources from the state's private sector due

to tax i is defined as the burden cost of tax source i, BC_i. This represents the private net income lost in taxes. The use of a state's public and private resources for administration and compliance is identified as the transactions cost associated with tax instrument i, TC_i. And the loss in individual welfare across the state above and beyond the tax revenues collected and the administrative costs incurred is appropriately defined as the excess burden cost of tax i, EXC_i. EXC_i results from the misallocation of resources in the private sector due to tax i.

Now the choice of tax shares by a state public official can be represented as an "as if" maximization of a concave preference function, $P^j(C^j, E^j)$. But due to median voter influence on the choice of E^j, $P^j(C^j, E^j)$ is weakly separable between C^j and E^j, and the choice process becomes a cost minimization specification. Specifically, the dominant public official in state j attempts to minimize:

$$C(T_i / \sum_i T_i) = C(BC_i, TC_i, EXC_i) \qquad (3.2)$$

by choosing optimal tax shares.[13,14] Due to the imposition of additive separability, this becomes a minimization of:

$$\sum_i C_i = \sum_i BC_i + \sum_i TC_i + \sum_i EXC_i \qquad (3.3)$$

for all i = 1,2,3,...n, subject to the balanced budget constraint:

$$\sum_i T_i + Z = E \qquad (3.4)$$

where Z = exogenous federal aid to state j, and subject to any appropriate constitutional and statutory limitations on

state taxing behavior.[15]

Ignoring specific legal limitations for the moment, for any state j, there are (n+1) equations and (n+2) unknowns. Therefore, the optimal shares chosen will be a function of E^j, the median voter choice variable in the second stage of this fiscal process. As a result, the state official opts to raise the needed revenue, as defined by the median voter, up to the point where the marginal dollar derived from each tax imposes the same efficiency costs on the state. In order to minimize the economic costs the public official must adjust the tax mix until the marginal costs of raising an additional dollar of tax revenue are equal for all tax sources, i. This result can be visualized in the simple two tax model pictured in Figure I.

The state official chooses the relative shares of total tax revenue attributable to T_1 and T_2 by equating the marginal costs across these two tax sources. At this point, the shape of each MC curve cannot be specified. Assuming $\partial C_i/\partial T_i > 0$ and $\partial^2 C_i/\partial T_i^2 > 0$, but $\partial C_1/\partial T_1 < \partial C_2/\partial T_2$ and $\partial^2 C_1/\partial T_1^2 < \partial^2 C_2/\partial T_2^2$, the respective MC curves can be represented as in Figure I. The result is the derived relationship between T_1 and T_2 in quadrant IV. T^* represents the tax mix function defined for different levels of spending, subject to the constraint that MC_1 and MC_2 are equal. When the median voter, faced with this relationship, chooses the optimal level of state spending, this E^* will define relative tax shares through the

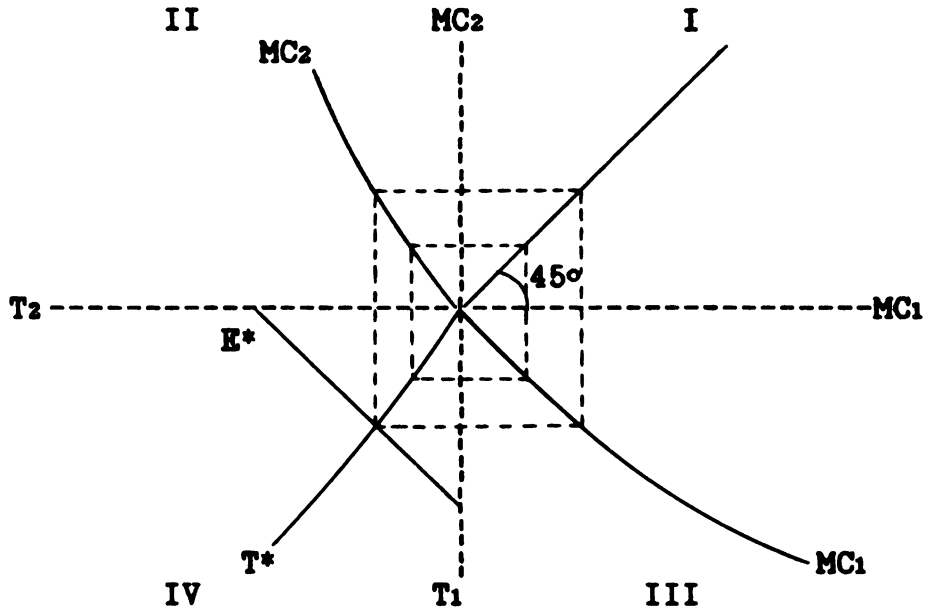

FIGURE I

balanced budget constraint. So my next step is to model the median voter process for choosing E*.

3.2.2 OPTIMAL EXPENDITURES IN A MEDIAN VOTER MODEL

Following the standard median voter models of public choice, sincere voters with single-peaked preferences will choose the optimal level of state spending, E*, given the state's optimal tax schedule as a function of E.[16] Voters can determine their individual tax shares given this tax structure relationship, thus translating the tax mix into individual terms.[17] Tax prices are not fixed in this framework, instead they are a function of the level of state spending chosen. Through majority voting with an odd number of voters, the median voter will determine the actual level of state expenditures. This E* will define

actual tax shares used by the state.

Model Specification

In developing the model more formally, consider voter k's utility function expressed in terms of private goods, X_k, and current state service output, G_k.[18]

$$U_k = U_k(X_k, G_k) \tag{3.5}$$

If G was considered to be a pure public good, then G_k would be identical for all individuals in state j. Allowing for congestion,

$$G_k = E/N^a \tag{3.6}$$

where N is the number of consumers of this state's services. If a = 0, state spending is a pure public good, no crowding exists. If a = 1, an individual's consumption is diminished by congestion, and G_k translates into the per capita spending share.

Each individual, k, is assumed to maximize utility subject to the standard budget constraint:

$$Y_k = X_k + d_k \sum_i BC_i \tag{3.7}$$

where Y_k is the individual's gross income and d_k is the individual's share of the burden costs of the tax structure, the individual's loss of private resources due to the state's chosen tax mix. Given individual k's relative federal and state marginal tax rates, relative tax bases, and state population, the net marginal tax price to this individual of $1.00 in state tax revenues can be determined. The individual's share of the net burden costs can be defined.[19] These costs are defined by total tax

revenue collected, and the fraction of these costs borne by individual k depend in part on the tax mix that would result after E* is chosen. Therefore, the second constraint that the median voter faces in choosing the optimal level of expenditures is the relationship defined in the monopoly bureaucrat choice process:

$$T_i / \sum_i T_i = f(E) \qquad (3.8)$$

for all i. By choosing E*, the median voter implicitly defines the revenue structure employed by state j, and thus his individual tax share. As in the two tax example of Figure I, the median voter chooses the optimal level of spending, taking into account the individual tax prices this spending choice defines. Given E*, the optimal tax mix is defined at the state level.

3.2.3 CONCLUSIONS AND IMPLICATIONS

Now that the sequential choice process has been defined, the dependence of the revenue structure on the expenditure level becomes evident. And vice versa, individual tax shares defined by a given tax mix will affect the desired level of state spending.

As desired spending increases, given a constant level of exogenous aid, the state has to collect more revenues in the form of taxes and user charges. The public official has to raise revenues in more costly ways, assuming prior optimization.[20] The further down into less desirable tax bases the state has to go, the more costly revenue raising becomes, i.e., the marginal cost of a tax increases as

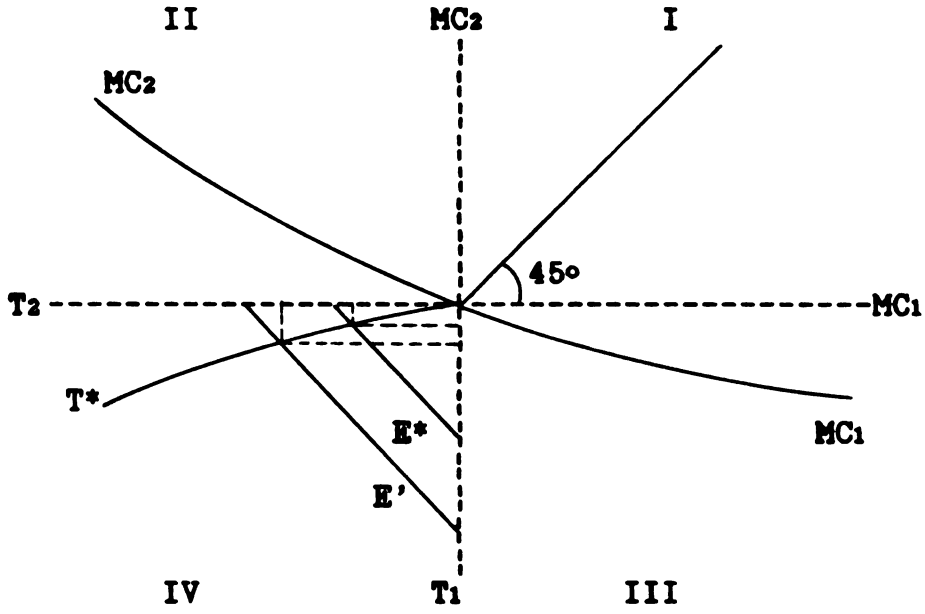

FIGURE II

revenues increase, $\partial C_i / \partial T_i > 0$, and $\partial^2 C_i / \partial T_i^2 > 0$. Realistically assuming that MC_i rises at different rates for different tax sources, i, all else constant, the composition of revenues depends on the spending level chosen. This can be seen in Figure II. An increase in E* results in a greater increase in T_2 than T_1, since $\partial MC_2 / \partial T_2 < \partial MC_1 / \partial T_1$.

Likewise, desired state spending is affected by the resulting tax structure. The median voter, faced with the tax mix relationship defined in the monopoly bureaucrat model, knows that for each level of expenditure there exists a defined state revenue structure which will determine this voter's individual tax share. Therefore, the final equilibrium is as if both decisions were made

simultaneously. The sequential model results in the median desired level of spending and an optimal state tax structure.

3.3 ECONOMIC DETERMINANTS OF COSTS

I have identified three different costs associated with levying state taxes and user charges: the burden costs to the residents, the transactions costs of administration and compliance, and the excess burden costs of the welfare loss above and beyond the tax revenues collected. I will not attempt to solve equations (3.1) through (3.4) of the state bureaucrat model, and equations (3.5) through (3.8) of the median voter model, in order to generate predictions about the resulting tax mix through the comparative statics. Instead, I will identify the economic determinants of each of these costs and predict their influence on a state's optimal tax structure.

3.3.1 BURDEN COSTS

A major determinant of optimal tax design on the margin is the net burden cost of a tax, BC_i. The burden costs to a state's residents are the net losses of private income due to tax i. A dollar of tax need not result in a dollar reduction of state private income. Available credits, deductions, and exporting to nonresidents may all reduce these net costs to something less than a full dollar. Specifically,

$$BC_i = (1-h_i)T_i \qquad (3.9)$$

where $(1-h_i)$ represents the net burden cost of a dollar of tax revenue, T_i.

The spatial shifting of a tax among states due to market conditions allows a fraction of the burden to be transferred to out-of-state factor owners or consumers through higher prices. Indirect shifting also occurs by the movement of taxpayers across state lines. Through both direct taxation of nonresident firms and individuals and this indirect shifting, the portion of tax i which residents do not bear can be represented by e_i. State taxes that account for a large volume of exporting in this manner are the corporate net income tax, severance taxes, wage and sales taxes.

Available credits and deductions also play a big role in determining the net burden costs of a tax. Even without the spatial shifting of taxes through exporting, residents may not bear the full dollar cost of a dollar in revenue. Provisions in federal tax law permit itemization of state and local taxes paid in arriving at federal taxable income. Currently, state and local income, real estate, general sales, personal property, and value-based automobile taxes can be deducted from adjusted gross income to arrive at taxable income. This deduction essentially is a federal subsidy to the state and local governments. When making government financing decisions, some states may purposely switch from one tax to another to take advantage of these deductibility benefits.[21]

In addition to the federal offset of certain state and local taxes paid, in some states there also exists state deductibility of federal personal income taxes paid. Where this reciprocal deductibility occurs, there are feedback effects. The federal offset essentially lowers the burden costs of $1.00 in state tax revenues by the state average federal marginal tax rate, v_j. With the state offset also applied, each dollar of federal income tax paid decreases state taxes by t_i, where t_i represents the average marginal state tax rate in state j for tax i. This decline in state taxes increases the burden costs of a dollar in state tax revenues by $t_i v$, because now the federal offset is less. But, this increase in state taxes of $(t_i v)$ increases the federal offset. The burden costs of a dollar in state tax revenues now falls by $v^2 t_i$, while the state offset decreases by $t_i (v^2 t_i)$. This process continues in theory, the increase in state taxes causing an increase in the federal deductibilty component, decreasing the burden costs of state tax revenues by $v(v^2 t_i^2)$, etc. Therefore, the burden costs of a dollar in state tax revenue after accounting for this reciprocal deductibility becomes:

$$1 - v + vt_i - v^2 t_i + v^2 t_i^2 - v^3 t_i^2 + v^3 t_i^3 - \ldots \quad (3.10)$$

Grouping the appropriate terms, this becomes:

$$1 + vt_i + v^2 t_i^2 + v^3 t_i^3 + \ldots$$
$$- v - v^2 t_i - v^3 t_i^2 - v^4 t_i^3 - \ldots \quad (3.10a)$$

or,

$$\sum_{n=0}^{\infty} v^n t_i^n - v \sum_{n=0}^{\infty} v^n t_i^n, \quad (3.10b)$$

which becomes:

$$(1-v)\sum_{n=0}^{\infty} v^n t_i^n \qquad (3.10c)$$

Substituting for the infinite series, this becomes:

$$(1-v)/(1-vt_i) \qquad (3.11)$$

Note that when v = 0, the net burden costs are one dollar for one dollar in state taxes. When t_i = 0, the net burden costs are (1-v). Individuals with no federal income tax liabilty do not benefit from the deductibilty provision. Of course, this assumes that all individuals that do pay federal and state taxes are itemizers.[22]

Combining the reciprocal deductibility provisions with the shifting of costs to nonresidents through direct and indirect exporting,

$$(1-h_i) = [(1-v)/(1-vt_i)][1-e_i] \qquad (3.12)$$

Now,

$$BC_i = [(1-v)/(1-vt_i)][1-e_i]T_i \qquad (3.13)$$

represents the net burden costs of total tax revenues from tax i. Summing over all taxes,

$$\sum_i BC_i = \sum_i [(1-v)/(1-vt_i)][1-e_i]T_i \qquad (3.14)$$

represents the total net burden costs to the state of raising revenues through taxes and user charges.[23] Therefore, any change in one of these determinants of burden costs may trigger a response in a state's optimal tax mix.

For example, eliminating the deductibilty opportunity for one state tax will increase the relative burden costs of that particular tax. In response, a state may be

inclined to use less of that tax in proportion to total tax revenues raised. If all of deductibility were eliminated, then the advantage of a lower marginal burden cost due to the federal offset would disappear for all taxes currently deductible. Likewise, on the median voter side of the model, eliminating deductibility for one or all of the state taxes currently provided for will alter this voter's desired spending level. If total net burden costs increase, the median voter's loss in private income due to taxation will increase. The resulting change in desired spending dictates a consequent change in the optimal tax mix chosen. This change in tax structure may translate into a change in the median voter's share of the net burden costs, dk, depending on the tax rate changes relative to the average tax rate changes.

In terms of the simple two tax diagram of Figure III, if an existing deductibility provision was eliminated with tax source T_2, this elimination would result in an increase in the marginal costs of raising revenues through T_2. Therefore, the state public official's derived relationship between T_1 and T_2 would change such that for the same level of desired spending by the median voter, the state would now prefer to use more T_1 and less T_2 relative to the previous tax mix. Given this new revenue relationship, if the median voter now decreases desired spending due to a greater loss of personal income through state taxation, the net effect is a decline in the use of T_2, and an ambiguous

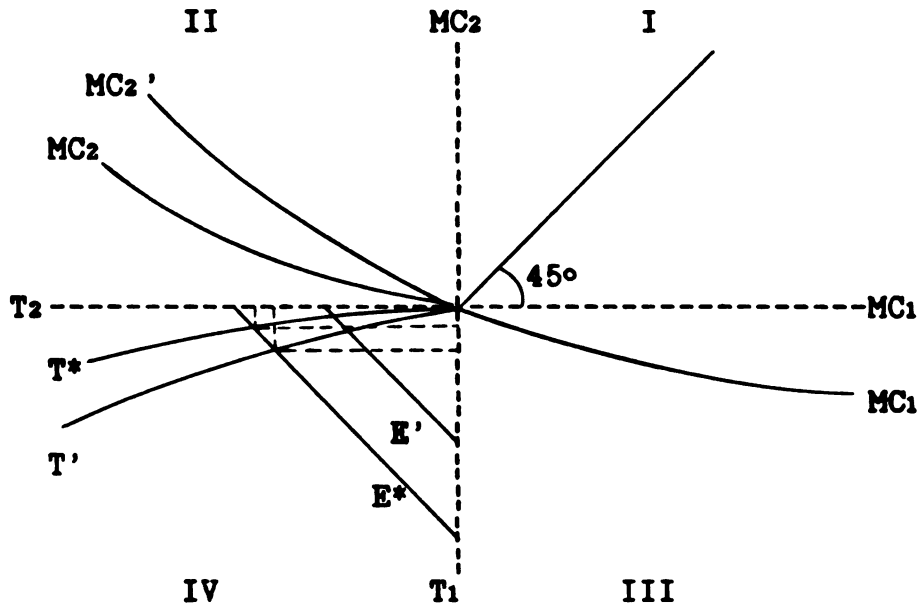

FIGURE III

effect on the use of T_1, depending on the extent to which E* falls. Changes in the shares of T_1 and T_2 relative to total tax revenues will depend on these responses relative to the decline in total tax revenues now possible through the decline in desired spending.

Similarly, a drop in the exported portion of a tax in state j due to the spatial shifting of a tax through market conditions, e_i, will increase the marginal costs of that tax relative to the others. This will stimulate a response similar to that outlined in the previous offset example, as will a rise in the average state tax rate in state j, t_i.

So the traditional income and substitution effects can be identified on both sides of the model as the burden price of a particular tax changes. As the burden price of

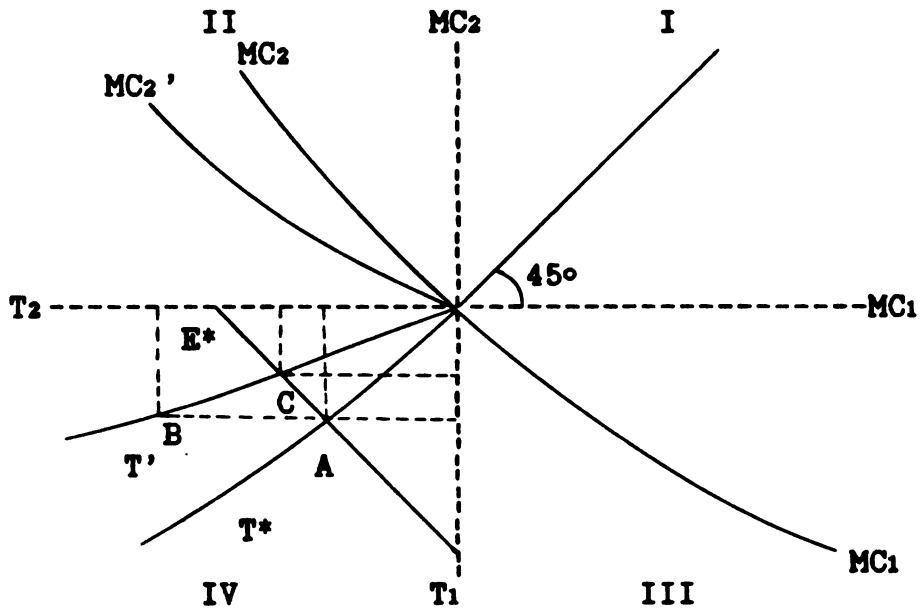

FIGURE IV

a state tax falls through some form of exporting (federal or state), in the monopoly bureaucrat model there is a substitution effect towards this tax. This can be seen in Figure IV by the movement from point A to point B. Given the existing level of T_1, the relative share of T_2 in total tax revenues increases as MC_2 falls. And since own revenues now increase above the initial required level determined by E*, all tax burdens may be reduced through the income effect, as revenues are allowed to fall back to E*. This is depicted as the movement from point B to point C.

On the median voter side, the individual loss of private resources due to state taxes may now be reduced, resulting in an income and substitution effect on the desired level of state expenditures.[24] If all state fiscal

activity is now viewed to be less costly relative to private consumption, desired state expenditures would increase. The resulting income effect may also support an increase in E*. The net effect on a state's optimal tax structure depends on the magnitude of the chosen spending increase and the resulting required revenue adjustment.

3.3.2 TRANSACTIONS COSTS

The second major determinant of a state's optimal tax choice is the transactions cost associated with a certain tax, TC_i. The withdrawal of resources from both the public and private sectors of a state due to the levying of a tax imposes administration and compliance costs on these respective sectors. Even systems that appear desirable and efficient based on burden costs and excess burden costs might be undesirable because of high administration and compliance costs. This may be one reason why all major tax sources are not used in some states.

Initially, these costs may be fixed costs. Each tax source may be ranked in increasing order of average transactions cost per dollar of tax revenue from tax i.[25] Therefore, when introducing a new source of revenue or changing the specifics of a tax already in place, the high initial cost of levying a new tax results in discontinuous changes in the state's tax structure. Only when the burden and excess burden costs of increasing reliance on existing taxes are sufficiently large, relative to the transactions costs of making the recommended changes, would the proposed

change from the status quo be justified. TC_i represents a threshold level of cost above which the change may take place. Generally,

$$\sum_i TC_i = \sum_i c_i \Delta T_i / \sum_i T_i \qquad (3.15)$$

where c_i captures this threshold property.

The administrative costs to the public sector of imposing a certain tax depend in part on the total tax revenue collected by the state. To some extent, economies of scale may exist as overhead costs are spread among taxes. Higher tax rates may yield higher revenue without greatly adding to costs. Therefore, $\sum_i TC_i$ may decrease as $\sum_i T_i$ increases (at a decreasing rate). Administrative costs are also a function of the number of taxes used in a state's tax system. With the existence of one tax source, the collection mechanism already exists for future taxes. So the transactions costs associated with the use of additional tax sources are not as high. $\sum_i TC_i$ increases as more tax instruments are used, but at a decreasing rate.

Changes in tax rates or shares also contribute to the transactions costs of a state's tax structure. The size of the changes in the rate structure or relative use are not as important in determining the administration costs imposed on the state as is the fact that the changes actually occurred. Nominally, $\sum_i TC_i$ would rise as another change takes place in the given tax structure. Similarly, as the complexity of a tax increases, the costs to the state of administering that tax increase (at an increasing

rate). The costs of administration per dollar of revenue increase with the complexity of the tax law.

The compliance costs to taxpayers in a state are influenced by the same factors identified above. Increasing complexity, the number of different taxes used, and a given change in the tax structure all increase total transactions costs through compliance with the taxes levied. Assuming that the definition of c_i as a threshold parameter includes consideration of the number of taxes used and the complexity of a given tax system, the general specification of equation (3.15) is enough to capture these proposed effects.

3.3.3 EXCESS BURDEN COSTS

The last major component of the economic costs associated with optimal tax design is the excess burden cost associated with a given tax, EXC_i. Due to the tax induced misallocation of resources in the private sector, there is a loss of welfare above and beyond the sum of tax revenues collected and administrative costs incurred. Assuming that the amount of interrelatedness between the market in question and other markets is small enough to ignore cross-price effects, we can separately sum EXC_i across all markets. Specifically,

$$\sum_i EXC_i = -1/2 \sum_i (E^D_i E^S_i / E^D_i + E^S_i)(t_i^2 P_i Q_i) \qquad (3.16)$$

where E^D_i and E^S_i represent the compensated price elasticities of demand and supply respectively.[26] P_i represents the price of the good or the factor which serves

as the base for tax i, and Q_i represents the aggregate quantity demanded or supplied in state j.

Obviously, the most efficient taxes in terms of EXC_i are those levied on commodities or inputs with a price inelastic supply and/or demand. The less opportunity an individual has to alter his behavior as a result of taxation, the less is the distortion introduced into the state economy with respect to resource allocation. On efficiency terms alone, the best state taxes are those levied on goods that have few substitutes in either production or consumption. These tax bases are very inelastic, and individuals do not seek out alternative non-taxed activities due to tax rate changes.

Note also that EXC_i varies with the square of the average marginal state tax rate in state j, t_i. A number of low tax rates levied in state j can produce the same revenue at a lower $\sum_i EXC_i$ than one tax levied at a higher rate. The excess burden costs of a tax increase more than proportionately with increases in its rate. Therefore, the more progressive a given tax structure, the greater the marginal excess burden costs of that tax.

Rewriting equation (3.16) in terms of total tax revenue from a given tax,

$$T_i = t_i P_i Q_i \qquad (3.17)$$

Therefore,[27]

$$\sum_i EXC_i = -1/2 \sum_i (E^{D}_i E^{S}_i / E^{D}_i + E^{S}_i)(t_i T_i) \qquad (3.18)$$

Marginal excess burden costs are positive and increasing,

as long as a change in tax revenues raised by tax i implies some necessary change in the state's average marginal tax rate.[28]

Of course, this analysis assumes there are no other distortions in the economy other than the tax under consideration. But monopolies, externalities, and pre-existing taxes may already be present before a tax is introduced. Some taxes impose welfare costs on the state's residents, but actually they may be correcting a distortion already present in the economy. For example, state excise taxes on alcohol, cigarettes, and gasoline may all be correcting a pre-existing distortion. Note also in this analysis, $EXC_i = 0$ for any user charge, i. User charges perform an allocative function. To the extent that they are correctly levied, they impose no inefficiencies on the state economy.

3.4 CONCLUSION

The simple specification presented above outlines the basic economic determinants that affect the choice of a state's optimal revenue structure. On the revenue side, a state public official minimizes the costs of raising revenue by equating the marginal costs across all tax sources, i. The economic determinants of these burden costs, transactions costs, and excess burden costs all play a role in this choice process. But the political, historical, and legal constraints present in a particular

state are also very important.

On the spending side of the fiscal decision, the median voter chooses the state's desired expenditures, given the derived relationship of tax shares as a function of spending. This function defines for the median voter an implied individual tax burden on which to base his decision. This sequential model results in the median desired level of spending and an optimal revenue structure as if the decisions were made simultaneously.

Given this basic structure, I am now able to investigate to what extent these economic factors affect a state's tax mix relative to the political, historical, and legal considerations also involved. By identifying the reduced form determinants of these factors, I can estimate their effects on a state's chosen tax structure directly, and determine their importance empirically. I have shown that economic factors should matter, whether they do or not is what I will proceed to investigate.

CHAPTER III

FOOTNOTES

[1] Zimmerman, in his 1983 NTJ article, recognized not only that tax shares affect budget size, but that budget size also influences the median voter's tax share. As a majority coalition, individuals will attempt to redistribute income towards themselves as government spending increases.

[2] See Hettich and Winer, 1984.

[3] A change in either the rate schedule or base of any tax will alter relative tax shares for all taxes.

[4] Essentially, I am following Hettich and Winer, 1984, with this simplification. A change in a state's tax mix implies a change in tax rate schedules, base definitions, and/or available exemptions, deductions, and credits.

[5] Since implicitly, I am assuming that a structural change elicits a corresponding change in relative shares.

[6] See the optimal tax literature of Feldstein, 1973, Mirlees, 1971, Sadka, 1976, Sandmo, 1976, Seade, 1977, and Stern, 1976.

[7] See Inman, 1979.

[8] Therefore, this preference function is continuous, monotonic, and quasi-concave. Continuity rules out lexicographic ordering, completeness and transivity reject Arrow's Impossibility theorem.

[9] C(.) and E(.) are defined over the approaching fiscal year.

[10] Debt financing involves shifting current financial burdens onto future generations at the cost of an interest premium. Essentially, this represents a form of exporting to future state residents.

[11] See Morgan and Mutti, 1983.

[12]See Hettich and Winer, 1984.

[13]$C_i(.)$ is assumed to be continuous and quasi-convex, such that a minimum is defined.

[14]For simplicity, all j superscripts will be dropped.

[15]Political, legal and historical limitations also impose constraints on state taxing behavior. State laws that limit which taxes can be utilized, and to what extent, necessitate review of state taxing codes.

[16]See Barr and Davis, 1966, Bergstrom and Goodman, 1973, and Borcherding and Deacon, 1972.

[17]The median voter is assumed to have full knowledge. He knows his own tax bases relative to the respective totals, thus enabling him to translate T_i into individual terms.

[18]This utility function is assumed to be strictly quasi-concave. Preferences are complete, transitive, and closed to ensure a maximum.

[19]If an individual's share of net burden costs is defined on a per capita basis,

$$d_k = 1/N$$

Otherwise, d_k is a function of v_k relative to the average v in state j, t_k relative to the average t in state j, b_k relative to the average b in state j, and N, where t_k represents the tax rate faced by individual k, and b_k the tax base relevant for individual k. A change in a state's revenue structure will most likely change d_k.

[20]Realistically, a percentage change in a given tax rate implies a corresponding change in the respective tax base, i.e., the elasticity of the tax base with respect to the tax rate does not equal zero. As rates increase, the available tax base falls, $\partial b_i/\partial t_i < 0$. Since total revenue from tax i, $T_i = b_i t_i$, the elasticity of T_i with respect to t_i will be between 0 and 1, assuming a relatively inelastic base. As t_i increases, T_i also increases, but by proportionately less. If the tax base is relatively elastic, as t_i increases, T_i will fall. The elasticity of T_i with respect to t_i will vary across all i. Note that this implies that if the elasticity of b_i with respect to t_i equals zero for some i, this tax would be used more intensively than if this elasticity approached negative one (see footnote 28).

[21]Assuming no change in v, this represents a form of exporting to the federal government.

[22]This assumption can easily be adjusted for by including a term for the portion of state taxes which can be deducted from the federal income tax, p_f, and the portion of federal taxes which can be deducted from the state income tax, p_s. This essentially implies the portion of itemizers in state j.

[23]There are no deductibility provisions for user charges. Only nonresident exporting applies.

[24]The resulting income and substitution effects depend on the change in ΣBC_i versus the change in dk. If both ΣBC_i and dk fall, the individual income loss of private resources would be reduced. If ΣBC_i falls greater proportionately than dk increases, again the private income loss due to state taxes is reduced. Otherwise, the individual loss of private resources due to state taxes will increase.

[25]If the number of tax instruments available is large, TC_i may be approximated as a continuous function.

[26]Equation (3.16) assumes an ad valorem tax rate, t_i, and increasing costs.

[27]This is for a proportional tax. If instead I considered a progressive tax, then I would have to estimate the marginal tax rate for each income class, estimate total income within each bracket, and use this to calculate EXC_i in each bracket given the relevant elasticities. Then I would have to sum EXC_i across all brackets. See Browning, 1976.

[28]Since:

$$T_i = t_i P_i Q_i$$

$$\partial T_i / \partial t_i = P_i Q_i + t_i \partial(P_i Q_i)/\partial t_i$$

Due to base erosion, an increase in tax revenues by one dollar requires a greater proportional increase in t_i. If at higher levels of taxation, T_i increases even less for the same percentage change in t_i than at a lower level of receipts, then marginal excess burden costs increase at an increasing rate (see footnote 20).

CHAPTER IV

AN EMPIRICAL SPECIFICATION OF STATE FISCAL BEHAVIOR

In this chapter, I identify the empirical determinants of optimal state tax design. Because I am attempting to explain tax shares across states, I will focus mainly on the net burden costs of state taxation, highlighting the role exporting plays in defining these costs. It is not that transactions costs and excess burden costs are not important, it is just that they become more significant in a tax rate and base structure choice than a tax mix choice.

The empirical framework of a state's political economy is outlined in Section one. With reference to the theoretical objectives set out in the previous chapter, the empirical specification is modeled as a two stage approximation to the spending and financing decisions hypothesized.

The data chosen to estimate this fiscal model are presented in Section two.[1] Specifically, the dependent and independent variables used are identified and compared to alternative measures. The final equations estimated within the theoretical framework are presented in Section three. A conclusion follows in Section four.

4.1 EMPIRICAL FRAMEWORK

The estimation of the general fiscal model of a state's political economy is advanced as a two stage approximation to the theoretical objectives outlined in the previous chapter. At the state level, the optimal finance mix is chosen as a function of public spending by equating the marginal costs across all tax sources. A state public official defines the relationship between alternative tax structures and government spending and announces this information to the voting public. The median voter in the state translates this knowledge into individual terms, determining his tax burden based on his share of the state's net burden costs associated with these alternative tax structures.[2] Given this burden, the desired level of government expenditures is chosen, and the resulting tax mix is implicitly defined.

Through this sequential choice process, the economic factors that define the net burden costs of raising tax revenues will influence both a state's revenue structure and total desired spending. It is only after the optimal level of spending is chosen that the state's finance structure is ultimately determined. Therefore, in stage one of the empirical specification, tax shares are modeled as a function of the marginal net burden costs associated with alternative tax sources, and as a function of total taxes per capita. Because I am focusing only on non-debt current state revenues, an increase in total spending will

increase required tax revenues through the balanced budget constraint.[8]

Given this relationship, the median voter chooses desired state spending, so in stage two total taxes and total charges per capita are modeled as a function of the marginal net burden costs identified in the first stage, and the standard variables used to identify the median voter in the state. Marginal net burden costs represent for the median voter the information on tax shares and spending defined in stage one. Theoretically, the median voter's tax price is not fixed. It is a function of the state's tax mix through the effects of that mix on total burden costs and the median voter's share of these costs. In this manner, tax exporting affects the median voter's tax burden. Once desired spending is chosen, the optimal tax mix is determined. I am now able to substitute the stage two estimation of total taxes per capita into the tax share equations to derive the reduced form determinants of an optimal state tax structure.

4.2 EMPIRICAL DATA

Observations on state governments provide the empirical basis for investigating the tax structure model proposed. Because I focus on the composition of state revenues, separating out the local tax structure choice, I use 1982 state data for all fifty states. An alternative estimation might include local taxes, particularly local property

taxes. But because the choice of which taxes to use is mainly a state decision, I will concentrate initially on the state fiscal process, leaving the combined state and local model for later research.[4]

4.2.1 INDIVIDUAL TAX SHARES

The percent distribution of state government tax revenue for individual income, general sales, and selective sales was taken from State Government Tax Collections in 1982, U. S. Department of Commerce, Bureau of the Census. As Table I shows, it is difficult to identify any obvious underlying pattern associated with these shares. But there are several individual state by state observations that suggest that economic factors are an important determinant of a state's tax mix.

General Sales Tax Share, TXSHGS

The largest source of tax revenue at the state level is the general sales tax. It averaged 31 percent of total state tax revenues in 1982, accounting for over fifty percent in Florida, Hawaii, Nevada and four other states. Yet in Massachusetts, Oklahoma and Vermont it accounted for less than twenty percent of receipts. So there is considerable variation among the forty-five states that use the tax.

Some of these differences can be explained by the comprehensiveness of the sales tax base. Of the seven states that rely on this tax to provide over one half of total state tax revenues, Hawaii, Mississippi, Nevada and

TABLE I

PERCENT DISTRIBUTION OF STATE GOVERNMENT TAX REVENUES FOR SELECTED TAXES: 1982

STATE	GENERAL SALES	SELECTIVE SALES	INDIVIDUAL INCOME	OTHER[1]
ALABAMA	28.7	32.4	21.9	17.0
ALASKA	(X)	2.6	0.1	97.3
ARIZONA	43.2	12.7	23.7	20.4
ARKANSAS	33.2	20.6	28.0	18.2
CALIFORNIA	35.4	8.9	34.2	21.5
COLORADO	36.3	15.4	32.4	15.9
CONNECTICUT	42.9	27.5	5.8	23.8
DELAWARE	(X)	14.6	48.1	37.3
FLORIDA	50.1	25.3	(X)	24.6
GEORGIA	33.2	18.6	36.0	12.2
HAWAII	54.1	13.1	26.5	6.3
IDAHO	25.3	16.1	38.0	20.6
ILLINOIS	31.4	18.8	29.9	19.9
INDIANA	49.3	15.1	24.4	11.2
IOWA	26.2	16.5	36.1	21.2
KANSAS	32.6	15.6	31.9	19.9
KENTUCKY	27.4	18.1	24.1	30.4
LOUISIANA	29.6	15.8	7.0	47.6
MAINE	34.1	19.9	28.7	17.3
MARYLAND	25.0	19.0	42.4	13.6
MASSACHUSETTS	19.1	14.3	48.3	18.3
MICHIGAN	29.2	12.3	33.7	24.8
MINNESOTA	23.0	17.2	40.8	19.0
MISSISSIPPI	52.5	14.6	11.5	21.4
MISSOURI	36.3	15.1	32.9	15.7

TABLE I (cont.)

STATE	GENERAL SALES	SELECTIVE SALES	INDIVIDUAL INCOME	OTHER[1]
MONTANA	(X)	19.4	27.2	53.4
NEBRASKA	33.5	23.5	26.3	16.7
NEVADA	50.4	35.1	(X)	14.5
NEW HAMPSHIRE	(X)	46.9	4.6	48.5
NEW JERSEY	24.7	26.6	23.4	25.3
NEW MEXICO	43.5	13.4	1.3	41.8
NEW YORK	20.7	13.2	52.0	14.1
NORTH CAROLINA	20.6	23.6	38.2	17.6
NORTH DAKOTA	27.6	13.6	6.6	52.2
OHIO	31.3	25.6	21.4	21.7
OKLAHOMA	17.8	15.7	23.6	42.9
OREGON	(X)	12.3	62.4	25.3
PENNSYLVANIA	27.2	22.4	24.3	26.1
RHODE ISLAND	29.6	24.6	31.9	13.9
SOUTH CAROLINA	33.0	21.8	32.8	12.4
SOUTH DAKOTA	54.3	31.7	(X)	14.0
TENNESSEE	52.1	23.9	2.1	21.9
TEXAS	38.3	24.4	(X)	37.3
UTAH	40.8	13.2	34.8	11.2
VERMONT	14.6	30.9	33.9	20.6
VIRGINIA	20.7	21.2	44.7	13.4
WASHINGTON	53.6	18.5	(X)	27.9
WEST VIRGINIA	53.2	16.8	20.8	9.2
WISCONSIN	24.4	15.2	42.7	17.7
WYOMING	29.9	6.9	(X)	63.2

[1] "Other" includes mainly corporate net income, license, and severance taxes.
(X) Not Used.

SOURCE: State Government Tax Collections in 1982, U. S. Department of Commerce, Bureau of the Census.

South Dakota include food as a taxable item. Twenty four of the states that rely on general sales taxes exempt food, usually for equity reasons. This reduction in the base represents a substantial loss in revenue to state governments, evidently not made up through higher rates.

Based on simple observation, exporting appears to play a role in determining general sales tax reliance. These taxes are deductible from federal individual income taxes. Therefore, the marginal net burden cost of one dollar raised through this tax is reduced in direct proportion to the individual's federal marginal income tax rate. States that are relatively rich benefit more from the use of this tax on the basis of exporting, due to the higher percentage of itemizers and higher average federal marginal tax rate.

A substantial tourist flow also benefits states, as a higher percentage of general sales tax receipts are shifted to nonresidents. Florida, Hawaii, and Nevada are good examples of states that may rely more on consumption-based taxes due to their tourist trade, thus generating a considerable amount of revenue from external sources.

Individual Income Tax Share, TXSHY

The second most significant source of revenue for states is the individual income tax. In 1982, the state component averaged 25 percent of all tax receipts, ranging from close to fifty percent or over in Delaware, Massachusetts, New York and Oregon, to six states that did not use the tax at all. Again, this variation is evident

in the rate and base structures across states.

Three states, Connecticut, New Hampshire, and Tennessee, tax only some combination of interest, dividends or capital gains at a flat rate. Illinois, Indiana, Michigan, Massachusetts and Pennsylvania use a much broader base with a flat percentage rate. Nominally, Delaware, Minnesota and New York have very progressive rate structures. Interestingly, these three states also have a relatively high reliance on the individual income tax as a source of revenue.

Exporting appears to be an important factor here as well. State individual income taxes benefit from deductibility at the federal level. The more affluent states benefit relatively more due to the higher proportion of itemizers and the higher average federal marginal tax rate. Also, the more progressive the tax levied, the greater the gains through this federal offset. But there exists a countereffect for the sixteen states that allow state deductibility of federal individual income taxes. Feedback effects mitigate the advantage of the federal offset in relation to the state marginal income tax rate. This becomes more important for states with relatively progressive income tax structures, but the effect remains small. Minnesota and Delaware both have this state offset and progressive state personal income tax structures.

There is also a small migration effect that shifts a portion of a state's individual income tax to nonresidents

through commutation patterns. The journey-to-work flows from Connecticut and New Jersey into the New York metropolitan area result in considerable exportation of New York income taxes. Based on simple observation of these journey-to-work patterns across states, though, this effect does not appear to be strong in other regions of the country. State individual income taxes are exported almost entirely due to federal deductibility.

Selective Sales Tax Share, TXSHSS

Selective sales taxes provide an important revenue source for state governments, averaging 19 percent of total tax revenues in 1982. Variation in the use of this tax is quite marked, ranging from a high of 47 percent in New Hampshire to less than three percent of total tax receipts in Alaska. Some of the high outliers are due to a relatively greater reliance on the motor fuels tax, particularly Alabama, New Hampshire and South Dakota. Nevada's gambling related amusements tax accounted for over 62 percent of its total state selective sales tax receipts. Obviously, a large proportion of this tax is exported to nonresidents.

Generally, the selective sales tax is not deductible from federal personal income taxes. State excise taxes were offset at the federal level until 1964, state gasoline taxes until 1979. Now, only a value-based automobile sales tax remains deductible. If this tax is based on weight it is not offset by the federal government. Therefore, the

marginal net burden price of this revenue source, defined by the federal offset, is considered equal to one.

4.2.2 PER CAPITA TAX REVENUE, TN

Total state government tax revenue from State Government Tax Collections in 1982, U. S. Department of Commerce, Bureau of the Census, was adjusted by the total population of each state to derive per capita tax revenue by states for 1982.[5] Receipts averaged $826 across states, with evidence of considerable variation. New Hampshire claims the minimum per capita revenues of $353. Because over half of their total state and local tax revenues come from local taxes alone, it appears that a high degree of fiscal decentralization can be offered as a partial explanation for this small amount of per capita revenues at the state level. Alaska's per capita receipts represent the maximum, at $6348. This outlier is partially explained by this state's severance tax base relative to its small population. Severance taxes account for over sixty percent of Alaska's total state government tax revenue.

In the first stage of the empirical estimation, total taxes per capita influence a state's tax mix through the relationship defined by the state policymaker. Once a desired level of spending is chosen, defined per capita receipts are allocated across the individual tax sources as the share of each tax in total tax revenues. Through this specification, the reduced form influences on a state's tax mix can be determined. The expected sign on TN cannot be

specified a priori in these tax share equations. To the extent that marginal burden costs for various tax sources increase at differing rates, a state's revenue structure will depend on the size of the public sector. This estimation will show which taxes are inferior, normal, or superior.

In stage two of the empirical model, TN represents the largest component of state government expenditures, defined as non-debt current state revenues through the balanced budget constraint. Therefore, a simple median voter model is used to provide the basis for explaining the variation of TN across states. Added to this model, though, are the empirical determinants of a state's marginal net burden costs of raising tax revenues. These become important through the median voter's budget constraint. Tax exporting does affect the median voter's tax burden.[6] So this voter's individual tax burden is represented by his share of the loss of total state private resources due to the state's chosen tax mix. Given that for each level of expenditure there exists a defined state revenue structure which will determine this individual's tax burden, the determinants of the finance structure equations also influence TN. As these variables change, the state's tax mix defined for a given level of spending also changes, influencing the median voter's tax price.

4.2.3 PER CAPITA USER FEES, FN

General revenue of state governments from current charges was taken from Governmental Finances, Compendium of Government Finances, 1982 Census of Governments, U. S. Department of Commerce, Bureau of the Census. Total current charges of local governments only was subtracted from total current charges from state and local governments to arrive at state general revenues from user fees. This was adjusted by the total population of each state to derive per capita user fee revenues for 1982.

Per capital revenues from current charges averaged $117 across states, ranging from a high of $342 in North Dakota to a low of $37 in Florida. North Dakota collects the majority of charges at the state level, with miscellaneous commercial activity providing over half of these revenues. Conversely, Florida appears to collect the vast majority of charges and fees at the local level, with state government accounting for less than 15 percent. The two main sources of FN across states are education and hospitals, with transportation, environment and housing, and miscellaneous commercial activity accounting for the remainder.

Per capita charges are estimated in the second stage of the fiscal model, as a minor component of non-debt current state revenues. Through the balanced budget constraint these fees define a small portion of total state expenditures. Therefore, the same standard median voter model is used to explain the variation of FN across states,

including the elements of the revenue structure equations through their effects on the median voter's individual share of the net burden costs of raising revenues.

4.2.4 EXPORTING THROUGH THE FEDERAL OFFSET

The influence of federal deductibility of state individual income and general sales taxes on tax shares across states can be estimated by computing the average burden price of each tax, for each state, concentrating solely on the effects of the federal offset on these prices. One dollar of state revenue raised through a deductible tax need not result in a dollar reduction of state private income. For itemizers, this burden price will be something less than a full dollar, varying proportionately with their federal marginal tax rate. Therefore, for each state, the average burden price will also be less than one, varying across states as the proportion of itemizers differs across states.

One obstacle that has to be hurdled in deriving these average burden prices is to formulate prices that exhibit the variation not only across states, but also across tax sources within states. In its simplest form, the burden price of one dollar in state taxes for an itemizer becomes $(1-v_k)$, where v_k is individual k's federal marginal tax rate. Therefore, on average, the burden price of one dollar in state taxes becomes:

$$BP = p(1-v) + (1-p) \qquad (4.1)$$

where p represents the proportion of itemizers in a state,

and v is the average federal marginal tax rate for the state. This formulation does exhibit variation across states. But except for the minor adjustment in the presence of state deductibility of federal taxes, the variation between the state individual income tax and the general sales tax is not captured.

To correct for this problem, p_i can be redefined as the amount of tax i deducted as a fraction of total state revenues from tax i. Now,

$$BP_i = p_i(1-v) + (1-p_i) \qquad (4.1a)$$

Variation exists across states and across taxes within states, as deductions as a fraction of total revenues differ for the income and general sales tax. However, some states do not use a particular tax source. Yet due to residency and commutation patterns, a portion of that tax is deducted by the residents of those states. In this case p_i is undefined, along with the average burden price of that tax.

A second obstacle that has to be hurdled in defining BP_i is that of endogeneity. In order to correctly estimate the effect of these average burden prices on alternative tax shares, they must be exogenous. Examination of equation (4.1) suggests that this is not the case. As the average burden price changes, tax shares are affected. But as tax shares change, the income distribution may also change. This alters the average burden prices through the proportion of itemizers in the state. Because it is

necessary to separate the price and income effects from a change in these average burden prices, a weighting scheme is required that is independent of the effects of federal deductibility on the income distribution.

However, equation (4.1a) does not provide a complete solution. By defining p_i as the actual share of tax i deducted, the influence of tax levels on the average burden price remains. As a state's revenue structure changes, tax deductions as a fraction of receipts from that tax also change. Therefore, even though p_i provides variation across tax sources, it does not eliminate the problem of endogeneity with tax revenues.[7] I need to separate the price and revenue effects from a change in average burden prices and remove the correlation between these prices.

A possible solution to both of these problems lies in a measure of tax capacity. The Advisory Commission on Intergovernmental Relations calculates a representative measure of fiscal capacity "...by estimating the amount of revenue each state would raise if an identical set of tax rates were used."[8] The rates used in this calculation are the national averages for each tax base. In addition, the tax bases used are standardized across states, so that individual state practices do not affect a state's tax capacity. Therefore, estimated tax yields vary only because of differences in states' overall tax bases. Because the rates chosen are independent of the rates used by a given state, and because capacity is measured for all

bases commonly subject to state taxation regardless of whether the state actually taxes that particular base, this measure of tax capacity is independent of the tax mix, level, or rate a state employs.

By redefining the average burden price of tax i as:

$$BP_i = c_i(1-v) + (1-c_i) \qquad (4.1b)$$

where c_i represents the amount of tax i deducted as a fraction of the state's capacity of tax i as measured by ACIR, I have both the variation and exogeneity necessary for a correct estimation. Ideally, a measure of the amount of tax i deducted should also be independent of the tax sources used by each state. As specified, BP_i provides a good approximation to an exogenous measure of what the marginal "first dollar" price would be if states adopted tax i at the national average rate for a standardized base. For those states that do not use a particular tax, yet their resident's claim some level of deduction, c_i is now defined. And for those states that allow state deductibility of federal personal income taxes, the average burden price for the state income tax is adjusted accordingly.[9]

Data on tax capacity by states, for each tax, was taken from ACIR, Tax Capacity of the Fifty States, Methodology and Estimates. Measures for 1979 were used as an approximation for 1982 capacity. Itemized deductions by states and tax were taken from IRS, Statistics of Income: Individual Income Tax Returns 1979, again using 1979 as an

approximation for 1982. The 1982 average federal marginal income tax rate for itemizers, by states, came from the IRS, Statistics of Income: Individual Tax Returns 1982 data file.[10] Adjustments for the provision of state deductibility were calculated using the 1982 average marginal state personal income tax rate at $20,000 AGI from Feenberg and Rosen.[11]

Specifically, the average burden price for the general sales tax, BPGS, averaged 0.95, ranging from a high of 0.998 in Oregon to a low of 0.884 in New York. On average, one dollar raised through the state general sales tax costs an individual ninety-five cents, due to the federal offset. The average burden price for the state individual income tax, BPY, averaged 0.79 across states, with Texas accounting for the high of 0.993 and New York claiming the low of 0.515. The average burden price for the state selective sales tax, BPSS, is equal to one. Generally, this tax does not benefit from the federal deductibility provision.

Phares estimated the percent of each tax exported through the federal offset for 1976.[12] Table II compares the residential share of state personal income and general sales taxes measured by Phares with the average burden prices calculated above. States that benefit from the federal offset according to Phares, also exhibit a relatively greater potential for exporting in this manner based on the average burden prices. The variation in BPY

TABLE II

COMPARING THE FEDERAL DEDUCTIBILITY POTENTIAL
FOR SELECTED STATE TAXES

STATE	BPY	BPGS	PINC[1]	PGEN[1]
ALABAMA	.815	.933	.793	.933
ALASKA	.650	.955	.783	1.00
ARIZONA	.818	.905	.755	.947
ARKANSAS	.827	.971	.768	.963
CALIFORNIA	.657	.906	.713	.926
COLORADO	.726	.908	.744	.917
CONNECTICUT	.911	.899	.159	.922
DELAWARE	.579	.991	.744	(X)
FLORIDA	.982	.966	(X)	.955
GEORGIA	.753	.947	.765	.950
HAWAII	.574	.920	.770	.960
IDAHO	.725	.962	.782	.947
ILLINOIS	.866	.923	.816	.929
INDIANA	.902	.955	.848	.960
IOWA	.765	.964	.803	.949
KANSAS	.843	.950	.797	.944
KENTUCKY	.771	.948	.810	.936
LOUISIANA	.940	.936	.789	.958
MAINE	.816	.964	.821	.958
MARYLAND	.551	.916	.777	.887
MASSACHUSETTS	.665	.948	.823	.935
MICHIGAN	.707	.933	.785	.918
MINNESOTA	.527	.956	.747	.933
MISSISSIPPI	.863	.938	.794	.959
MISSOURI	.862	.950	.811	.943

TABLE II (cont.)

STATE	BPY	BPGS	PINC[1]	PGEN[1]
MONTANA	.770	.997	.802	(X)
NEBRASKA	.837	.957	.800	.953
NEVADA	.985	.977	(X)	.949
NEW HAMPSHIRE	.936	.996	.140	(X)
NEW JERSEY	.780	.937	-.254	.912
NEW MEXICO	.867	.942	.734	.963
NEW YORK	.515	.884	.765	.915
NORTH CAROLINA	.725	.954	.795	.938
NORTH DAKOTA	.910	.977	.742	.964
OHIO	.859	.956	.827	.935
OKLAHOMA	.834	.951	.783	.945
OREGON	.643	.998	.788	(X)
PENNSYLVANIA	.809	.951	.839	.944
RHODE ISLAND	.774	.940	.787	.938
SOUTH CAROLINA	.738	.944	.792	.945
SOUTH DAKOTA	.982	.969	(X)	.964
TENNESSEE	.983	.939	.706	.956
TEXAS	.993	.958	(X)	.954
UTAH	.713	.907	.821	.931
VERMONT	.774	.980	.817	.935
VIRGINIA	.732	.940	.759	.919
WASHINGTON	.983	.917	(X)	.950
WEST VIRGINIA	.890	.974	.867	.986
WISCONSIN	.613	.943	.790	.936
WYOMING	.981	.951	(X)	.969

[1]Source: Phares, 1980. PINC = (1 - ratio of offset to tax for the state personal income tax). PGEN = (1 - ratio of offset to tax for the state general sales tax).
(X) Not Used.

appears to be the dominating factor in explaining the variation in the proportion of taxes exported through federal deductibility. Overall, the calculated average burden prices for each tax seem to provide an adequate measure of a state's potential to export through the federal offset.

If taxes are considered substitutes, then own price effects should be negative, cross price effects should be positive. The lower the average burden price of a tax, the greater the potential to export a larger fraction of that tax burden through federal deductibility. So, the greater is the relative share of that tax in a state's revenue structure, given a constant level of total revenues.

If a lower average burden price decreases the total net burden costs of a given tax structure, tax prices should be negatively related to total spending, given that the median voter's share of net burden costs remains constant. If lower prices increase the overall burden costs of total taxes, price effects will be positive in the TN and FN equations.[13] An increase in total burden costs increases the median voter's loss in private net income due to taxes, which increases his individual tax price and decreases desired state spending.

But as the revenue mix changes for a constant level of spending in the monopoly bureaucrat model, the median voter's share of net burden costs should also change. Underlying a change in a state's tax structure is an

implied adjustment in the relevant tax rates and/or bases, which will alter the share of taxes paid by the median voter. Therefore, the effect of a change in BPY or BPGS on total revenues depends on the combined influence of the change in total net burden costs versus the change in this voter's share of these costs. The coefficients from both the tax share equations and total taxes per capita are used to determine the reduced form magnitude of these effects on the revenue mix.

4.2.5 PRICE/MIGRATION EXPORTING

The spatial shifting of taxes to out-of-state residents occurs through the interstate movement of taxed commodities, the migration of people between states, and nonresident owners of in-state factors of production. Taxes most susceptible to this price/migration effect are severance taxes and corporate net income taxes. Nevada's gambling taxes, Hawaii and Florida's tourist trade, Delaware's corporate license tax, and the taxes on the extraction of natural resources in Texas, Louisiana, Alaska, and all the other mineral wealthy states account for the majority of shifting here.[14] In order to capture the variation across states in the potential to export through the price/migration effect, three different variables are used, representing manufacturing, mining, and tourism.

Manufacturing

McLure has argued that one major determinant of the price effects of a tax upon an industry, no matter what base that tax is initially levied on, is the dominance of the taxed firms in their respective markets.[15] A tax on a particular industry in a state is not likely to be shifted forward to consumers unless that state dominates production on a regional or national level. The greater the degree of dominance, the greater the potential to shift the tax via the pricing of nationally traded goods. In fact, in a competitive industry, the fraction of a tax that is potentially exportable to consumers in other states is directly related to the fraction of dominant national output produced in the taxing state, along with the relevant supply and demand elasticities. If a state does not dominant an industry, exporting of state taxes directed towards the industrial base in the state is limited to the burden placed on nonresident factor owners, as these taxes are absorbed by profits on capital or shifted backwards to less mobile factors.

To measure the ability of a state to export taxes in this manner, I formulate two alternative variables. Following McLure's methodology, I identify the four-digit manufacturing industries that are classified as serving national markets, and calculate each state's value added in manufacturing for national markets as a share of the state's total value added in manufacturing, VANM1.[16] Data

from the Census of Manufactures: 1982, U. S. Department of Commerce, Bureau of the Census, was used to do this across all states and all four-digit SIC industries. As Table III shows, the resulting pattern of industrial production for 1982 is very similar to McLure's estimates for 1958.[17]

Generally, it is thought that the greater a state's share of manufacturing for national markets, the greater the potential for exporting production-based taxes through the price/migration effect. The greater is VANM1, the larger the share of these taxes that can be exported out of state, and the lower the marginal net burden costs of any business tax, whether levied on costs, property, or profits. Therefore, VANM1 is expected to be negatively related to the level of individual income, general sales, and selective sales taxes used and positively related to the share of corporate net income taxes. And it should be positively related to total revenues. A decrease in the total net burden costs of the chosen tax mix decreases the median voter's loss of private net income due to taxes, all else constant. As state policymakers alter the revenue mix for the initial level of spending towards these production based taxes, the median voter's share of total costs may also fall.

But as argued above, an industry with a national market is a necessary condition for a state tax on that industry to be shifted across state lines. But it is not sufficient for exporting to occur through the price effects of forward

TABLE III

VALUE-ADDED IN MANUFACTURING FOR NATIONAL MARKETS

STATE	VANM	VANM1	MCLURE'S VANM[1]	MCLURE'S VANM1[1]
ALABAMA	0	.9069	0	.8850
ALASKA	0	.9055	0	.8680
ARIZONA	0	.8749	0	.7380
ARKANSAS	.017	.9420	0	.8550
CALIFORNIA	.174	.8772	.168	.8250
COLORADO	0	.8262	0	.8040
CONNECTICUT	0	.9277	.032	.8820
DELAWARE	0	.9814	0	.8880
FLORIDA	.005	.7948	0	.7230
GEORGIA	.064	.8810	.046	.8870
HAWAII	.121	.8696	0	.8240
IDAHO	0	.9173	0	.8730
ILLINOIS	.012	.8803	.091	.8760
INDIANA	0	.9073	0	.8950
IOWA	.170	.9084	0	.8450
KANSAS	0	.9165	0	.8690
KENTUCKY	0	.9054	.091	.8990
LOUISIANA	.006	.8534	.015	.8580
MAINE	0	.9135	0	.8870
MARYLAND	0	.8500	0	.8600
MASSACHUSETTS	.006	.9160	0	.8920
MICHIGAN	.384	.9238	.326	.9020
MINNESOTA	.002	.8890	0	.8440
MISSISSIPPI	0	.8579	0	.8460
MISSOURI	0	.8811	0	.8180

TABLE III (cont.)

STATE	VANM	VANM1	MCLURE'S VANM[1]	MCLURE'S VANM1[1]
MONTANA	0	.8103	0	.8460
NEBRASKA	0	.9052	0	.8270
NEVADA	0	.7739	0	.7400
NEW HAMPSHIRE	0	.9043	0	.9090
NEW JERSEY	.008	.8904	.039	.8880
NEW MEXICO	0	.8143	0	.6880
NEW YORK	.099	.9031	.163	.8880
NORTH CAROLINA	.216	.8964	.346	.9030
NORTH DAKOTA	0	.8255	0	.7060
OHIO	.009	.8933	.043	.8740
OKLAHOMA	0	.8294	0	.7750
OREGON	.051	.8686	.136	.8700
PENNSYLVANIA	.032	.8685	.183	.7820
RHODE ISLAND	0	.9545	0	.9170
SOUTH CAROLINA	.083	.9352	0	.9260
SOUTH DAKOTA	0	.8829	0	.7740
TENNESSEE	0	.8958	0	.8780
TEXAS	.089	.8599	.291	.8380
UTAH	0	.7695	0	.8340
VERMONT	0	.9560	0	.9070
VIRGINIA	.144	.8764	.102	.8780
WASHINGTON	.003	.8625	.056	.8980
WEST VIRGINIA	0	.8989	0	.9090
WISCONSIN	.018	.8715	.046	.8990
WYOMING	0	.8175	0	.7970

[1]Source: McLure, 1967, page 58.

shifting. A state must also dominate production in that market before exporting to out-of-state consumers becomes possible. An alternative measure of the potential for exporting would be one that displays market dominance across states in national industries. Again following McLure's methodology, I calculate a measure of state by state dominance, VANM.[18] This is also shown in Table III.

If a state accounts for as much as 40 percent of total value added in an industry with a national market, it is considered to dominate that industry. An additional adjustment is made if the industrial concentration of a market is such that the largest four, eight, or twenty firms produce as much as 50, 60, or 80 percent, respectively, of total output in the nation. In this case, the threshold is lowered to 25 percent of national value added. As Table III shows, measuring each state's dominance in manufacturing as a fraction of the state's total value added in manufacturing results in a pattern of state dominance for 1982 again very similar to McLure's estimates for 1958.[19] The greater is VANM, the larger the share of production based taxes that can be shifted to out-of-state consumers through higher prices. Therefore, as with VANM1, I expect VANM to be negatively related to the tax levels modeled, positively related to business taxes, and positively related to total revenues.

VANM1 averages 88 percent across states, with national production in Delaware at the maximum, accounting for 98

percent of total value added in the state, and national production in Utah at the minimum, representing 77 percent of total state value added in manufacturing. Florida, Montana, Nevada, New Mexico, and Wyoming all produce a relatively small amount for national markets, while Arkansas, Connecticut, Michigan, Rhode Island, South Carolina, and Vermont provide a relatively large share of state manufacturing for national markets.

Yet only twenty-two states dominate a national industry on the basis of VANM. And only six of these states produce more than ten percent of total state output in dominant industries. Michigan's automobile industry and North Carolina's tobacco and textile industries represent the only sources of state dominance that account for more than twenty percent of a state's total value added in manufacturing. With dominance representing such a small share of total production across states, and with state limitations preventing discrimination against any one industry on the basis of tax policy, the importance of this form of exporting in designing optimal state tax policy is questionable. It appears more likely for exporting to occur through the shifting of business taxes to nonresident factor owners rather than through higher prices to out-of-state consumers.

Mining

The same argument can also be applied to mineral extraction across states. Phares estimated that in 1976,

an average of 34.7 percent of total state and local severance taxes were exported, second only to the corporate net income tax.[20] It is generally believed that taxes on the extraction of natural resources, as opposed to the processing of these resources, are shifted to nonresidents much more extensively than most other taxes. Whether the shifting occurs through higher prices to consumers and/or through reduced economic rents to factor owners again depends on the degree to which a state dominates a particular industry.

In order to observe the pattern of dominance in mining industries across states, I apply the same methodology used for VANM1 and VANM to calculate a measure of state dominance in mineral production, denoted VAM. Data from the Census of Mineral Industries: 1982, U. S. Department of Commerce, Bureau of the Census, was used to determine which states dominated any particular mining industry based upon the condition that a state account for as much as twenty percent of total value added in that industry on a national basis. Measuring each state's dominance in mineral production as a proportion of the state's total value added in mining, the pattern of dominance which results suggests that on a national basis, some states do account for the majority of production in some industries. Therefore, to the extent that these resources are exported out of state, taxes on these resources will be exported to nonresident consumers through higher prices. Louisiana and Texas

dominate the petroleum and natural gas industries, West Virginia dominates bituminous coal, Arizona dominates the copper ore industry, and Minnesota dominates in iron ores. For each one of these states, this mineral extraction accounts for more than 68 percent of the state's total value added in mining.

But to focus on VAM as a measure of tax exporting through severance taxes is to ignore the shifting of these taxes backwards to nonresident factor owners. As Table IV shows, Texas, Louisiana, West Virginia and ten other states dominate in the extraction of mineral resources in the United States. But they are not the only states which rely extensively on severance taxes as a source of state government revenue. Alaska, Oklahoma, Montana, New Mexico, and Wyoming, along with six other states, rely on severance taxes to provide more than ten percent of total state tax revenue. Relative to most other states, this is a very significant tax base for these regions. Yet according to VAM, only two of these states benefit from this potential source of tax exporting.

Therefore, I calculate a state's total value added in mining as a fraction of that state's total personal income, VAM1, to measure the capability of a state to export its tax burden through the use of severance taxes.[21] This is also presented in Table IV. Because now dominance is not identified specifically, the degree to which economic rents are received by out-of-state factor owners, and the degree

TABLE IV

VALUE-ADDED IN MINING

STATE	VAM	VAM1
ALABAMA	0	.058
ALASKA	0	1.98
ARIZONA	.686	.025
ARKANSAS	0	.052
CALIFORNIA	.005	.038
COLORADO	.047	.083
CONNECTICUT	0	.001
DELAWARE	0	0
FLORIDA	.311	.016
GEORGIA	.831	.008
HAWAII	0	.001
IDAHO	0	.023
ILLINOIS	0	.018
INDIANA	0	.014
IOWA	0	.003
KANSAS	0	.113
KENTUCKY	0	.126
LOUISIANA	.859	.743
MAINE	0	.001
MARYLAND	0	.003
MASSACHUSETTS	0	.001
MICHIGAN	0	.019
MINNESOTA	.861	.013
MISSISSIPPI	0	.089
MISSOURI	0	.008

TABLE IV (cont.)

STATE	VAM	VAM1
MONTANA	0	.220
NEBRASKA	0	.015
NEVADA	.563	.044
NEW HAMPSHIRE	0	.002
NEW JERSEY	0	.001
NEW MEXICO	.022	.570
NEW YORK	0	.002
NORTH CAROLINA	.322	.004
NORTH DAKOTA	0	.274
OHIO	0	.020
OKLAHOMA	0	.368
OREGON	0	.002
PENNSYLVANIA	0	.023
RHODE ISLAND	0	.001
SOUTH CAROLINA	0	.003
SOUTH DAKOTA	0	.017
TENNESSEE	0	.012
TEXAS	.984	.312
UTAH	0	.121
VERMONT	0	.007
VIRGINIA	0	.025
WASHINGTON	0	.003
WEST VIRGINIA	.809	.280
WISCONSIN	0	.002
WYOMING	.007	1.11

to which taxes are shifted forward to nonresident consumers, both are represented by the relative importance of the mineral base in the state's economy. This determines the relative capacity to export these extraction-based taxes. It is generally believed that this results in a substantial amount of exporting for the mineral rich states.

So, I use VAM1 as an alternative measure of the potential for a state to export taxes through the severance tax. Shifting these taxes to out-of-state consumers through a dominant industry's market power over price may not be very important. Even though Texas dominates oil and natural gas extraction on a national level, its share of the international market renders any control over prices virtually nonexistent. A more likely result would seem to be exporting through out-of-state owners or extracters of minerals, as these taxes are shifted back to the factors of production.

VAM1 is expected to be negatively related to a state's use of individual income, general sales, and selective sales taxes. The more significant a state's natural resource base is, the greater the share of taxes that can be exported to nonresidents through severance taxes and the smaller the marginal net burden costs of raising tax revenues, due to the high propensity for exportability that these taxes exhibit. VAM1 should also be positively related to total spending, as the median voter's loss of

private net income declines. Total net burden costs for a given level of revenues are lower, and this voter's share of these costs may also fall as a greater share of revenues are raised from these mineral based taxes. Therefore, desired state spending, and the revenues required to finance this spending, should increase.

Tourism

The final variable used to proxy a state's potential for the price/migration exporting of taxes is the normal daily mean temperature across states, TEMP, taken from the Statistical Abstract of the United States, 1984, U. S. Department of Commerce, Bureau of the Census. California, Florida, Hawaii, and the other states with a substantial tourist trade are able to shift part of the burden of their consumption-based taxes to nonresidents through this flow of travel. The larger this potential base in the state's economy, the larger the share of these taxes that can be exported out of state. Exporting taxes through tourism also depends on the elasticity of demand associated with the tourist industry. To the extent that a portion of the taxes are shifted back into the state, less exporting will occur. Therefore, the variation across states in their ability to export taxes through the potential tourist trade also depends on the variation in the appropriate demand elasticities.

To the extent that TEMP directly reflects the variation in the volume of tourism across states, a relatively higher

normal average daily temperature implies a greater potential to export consumption-based taxes through a relatively lower marginal net burden price. Therefore, I expect TEMP to be positively related to general sales tax use and negatively related to individual income tax levels, depending on the degree of substitutability between these tax sources. The effect on selective sales and other taxes cannot be specified a priori.

TEMP should also be positively related to total revenues. As the total net burden costs for a given level of revenues declines, the median voter's individual tax burden will decrease, all else held constant. The effect of the change in the announced tax structure, towards the more intensive use of general sales taxes to finance current expenditures, will enhance or mitigate the increase in desired spending depending on its influence on this voter's share of total taxes.

So a state's industry profile across national markets, its natural resource potential on a national level, and the influence of the tourist trade on its economic base all represent the potential for a state to shift the burden of its taxes across its borders. Through this price/migration effect, states' residents pay less than a full dollar for one dollar raised in state tax revenues. According to Phares, corporate activity, natural resource extraction, and tourism account for the majority of exporting in this manner. The variables outlined here provide an adequate

representation of the variation in this potential to export taxes across states.[22]

4.2.6 EXPORTING USER FEES

One other measure of exporting is employed to capture the potential to shift the burden of user charges outside the state levying the fees. The marginal burden price of one dollar raised from current charges is calculated as the share of these general revenues borne by the residents of the state collecting the fees. Using data from Governmental Finances, Compendium of Government Finances, 1982 Census of Governments, U. S. Department of Commerce, Bureau of the Census, I separate out the share of these fees from highway and airport transportation, natural resources, parks and recreation, and miscellaneous commercial activity as a representation of the share borne by out-of-state residents. The remainder, as the share of the burden accruing to residents, measures a state's marginal net burden cost of raising revenues from current charges, BPF.

The majority of user fees across states are raised through charges on education and hospitals. Overall, these two sources account for more than 60 percent of all state and local general revenue from current charges. A more precise measure of BPF would involve separating out the fraction of revenue from all of these sources coming from nonresidents, including higher education tuition, highway tolls, airport fees, and state charges for the use of its

parks and natural resources. Since the degree of detail required to do this is not available, I use BPF as measured above as a sufficient approximation of the variation across states in their ability to export these fees.

BPF averages 87 percent across states, with Alabama exhibiting the largest share of fees accruing to residents and Alaska, Hawaii, Connecticut, New Jersey, New York, and the Dakotas shifting the most out of state. It appears that a state with a high propensity to export its taxes across state lines through the price/migration effect, also may possess a relatively high potential to export the burden of current charges levied in the state. Yet the degree of correlation BPF exhibits with the other variables representing the potential for price/migration exporting is small enough to allow its use. To the extent that user fees are substitutes for certain taxes, I would expect BPF to be positively related to the specific levels of those taxes utilized. But if fees are shifted out of state in the same manner that other taxes subject to the price/migration effect are exported, then BPF may actually complement some tax sources.

Therefore, a priori, the only prediction is that BPF be negatively related to the level of per capita revenues across states. The greater the share of these fees that can be shifted to nonresidents, the smaller the total net burden costs of financing a given level of spending and the smaller the median voter's individual tax burden, all else

constant. As the initial revenue structure shifts towards more intensive use of these fees, the median voter's share of total costs may also change, depending on his share of taxes and fees now collected. The overall effect on the demand for government services, and the required level of revenues to finance that spending, depends on the net effect of these two influences.

4.2.7 INTERSTATE TAX COMPETITION

As a preliminary attempt to address the issue of interstate tax competition, I calculate for each state, the average income tax share, COMPY, and the average general sales tax share, COMPGS, across those states with a contiguous border, and include these variables as constraints on a state's fiscal choices.[23] This represents a very simplified approach, because it implies that if states do compete, they do so with their geographic neighbors on a tax-by-tax basis. If significant, these variables will provide the justification and groundwork for further investigation of the existence and level of interstate tax competition.

The influence of COMPY and COMPGS in the tax share equations cannot be specified a priori. If state public officials are concerned with base erosion due to their tax policies relative to neighboring states, then own tax competition should be positive. The lower the average income tax share in surrounding states, the smaller this state's share of income tax in total tax receipts. The

higher is the average share, the more the state can rely on this source of revenue without the danger of interstate migration.

If instead, state policymakers attempt to attract resources from neighboring states, then own tax competition should be negative. The higher the share of income tax in surrounding states, the less intensively this state would use this tax source. Notice, though, that this may not be true in the reverse. A lower share of a tax in surrounding states' revenue profiles does not necessarily imply a higher reliance in this state. In fact, if states match a small average reliance on a tax, but do not follow an above average reliance, the response of own tax shares to COMPY and COMPGS may be asymmetrical.[24] With this in mind, own tax and cross tax competition across states is estimated on this tax share basis.

4.2.8 THE MEDIAN VOTER

The remaining variables used in this model of state fiscal behavior are the standard variables that identify the median voter across states. Optimal spending is chosen by the voting public based on the announced relationship between the revenue structure and alternative levels of expenditures. Marginal net burden costs not only influence this fiscal relationship, they also determine the median voter's individual tax burden, through his share of total net burden costs. Once desired state spending is chosen, the resulting tax shares can be identified. Therefore,

defining state expenditures as total non-debt current state revenues through the balanced budget constraint, the equations for TN and FN must include the variables that identify the median voter in the standard framework. These variables are median income and median grants. The median voter's individual tax burden is represented through the marginal net burden costs of alternative tax sources. As these costs influence a state's tax mix for a given level of spending, the loss in private net income due to taxes and user charges, and the median voter's share of this loss, may both change.

Median income, MEDINC, is measured as median family pre-tax nominal income, from Census of Population: 1980, Characteristics of the Population, General Social and Economic Characteristics, U. S. Department of Commerce, Bureau of the Census. Given the derivation of the average burden prices across tax sources, and the representation of MEDINC before taxes, median income and tax prices are not significantly correlated. Therefore, the tax price effects are independent of the pure income effects on the median voter side of the model. If state public services are normal goods, then a rise in median family pre-tax income should imply an increase in desired state expenditures as measured by TN and FN.

Federal aid to state governments is measured as the value of these grants to the median voter, MEDZ. This is approximated as the dollar value of these grants divided by

the number of families in the state.[25] Data from Government Finances: State Government Finances in 1982, U. S. Department of Commerce, Bureau of the Census, define federal grants to states as direct cash grants, payments for grants in-kind, payments to non-governmental entities which result in cash or in-kind services, payments to regional commissions, and payments for research and development in public service provision. No attempt is made to separate this variable into close-ended categorical and noncategorical grants and open-ended categorical aid. The effect of MEDZ on desired state spending, and thus required revenues, is expected to be positive.

4.3 ESTIMATING EQUATIONS

Now that all of the variables have been defined, the final equations can be described. In stage one, the relationship defined between a state's tax mix and total revenues in the monopoly bureaucrat model is based on the marginal burden costs of the alternative tax sources. Specifically,

$$TXSHY = a_0 + a_1 VANM \text{ or } VANM1 + a_2 VAM1 + a_3 BPY + a_4 BPGS + a_5 TN + a_6 TEMP + a_7 BPF + e_y \quad (4.2)$$

$$TXSHGS = b_0 + b_1 VANM \text{ or } VANM1 + b_2 VAM1 + b_3 BPY + b_4 BPGS + b_5 TN + b_6 TEMP + b_7 BPF + e_{gs} \quad (4.3)$$

$$TXSHSS = c_0 + c_1 VANM \text{ or } VANM1 + c_2 VAM1 + c_3 BPY + c_4 BPGS + c_5 TN + c_6 TEMP + c_7 BPF + e_{ss} \quad (4.4)$$

where e_i represents the error term for each tax share

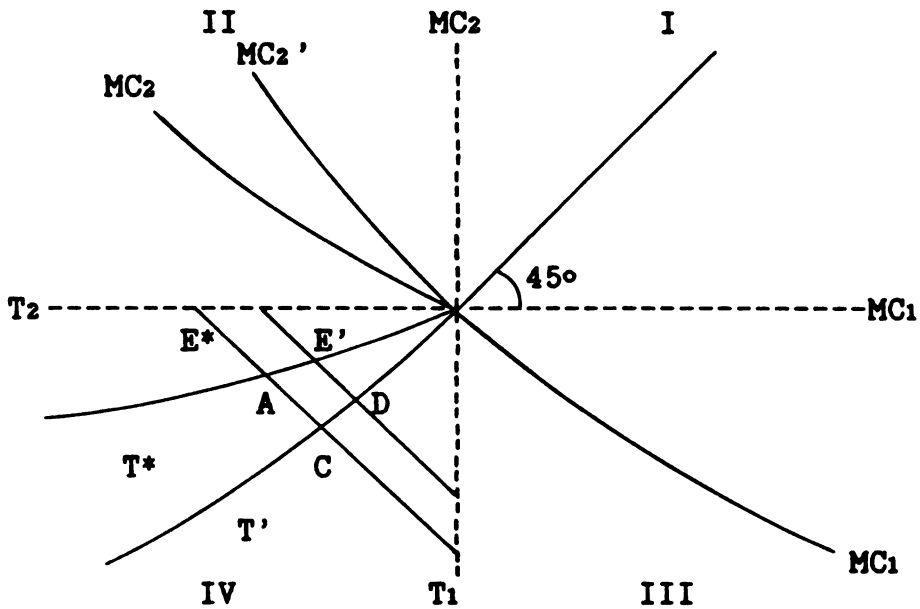

FIGURE V

equation i.

A shift in the marginal net burden costs of one of these tax sources will alter the defined relationship between taxes and total spending and therefore, change the resulting tax mix for a given level of resources. In terms of Figure V, this stage one estimation measures the shift in the announced relationship between tax sources from T* to T', due to the increase in MC2. The resulting tax structure change is from point A to point C, as spending remains constant. As desired spending changes, the pure revenue effect on the tax mix is captured by TN. To the extent that the marginal costs increase at differing rates across tax sources, an increase in total revenues will change the state's revenue structure along T*, all else

constant.

Because all tax shares across states must sum to one, by estimating the individual income, general sales, and selective sales tax shares, I am also implicitly estimating an equation for all the other taxes used by each state. Specifically,

$$OTHER = h_o + h_1 VANM \text{ or } VANM1 + h_2 VAM1 + h_3 BPY + h_4 BPGS + h_5 TN + h_6 TEMP + h_7 BPF + e_{ot} \quad (4.5)$$

where:

$$h_o = (1 - a_o - b_o - c_o),$$

$$h_n = (- a_n - b_n - c_n), \text{ and}$$

$$e_{ot} = (- e_y - e_{gs} - e_{ss})$$

for n = 1, 2, ..., 7. The major components of this other category include severance taxes, corporate net income, and license taxes. As the estimated coefficients across all shares must sum to zero, the coefficients for these other taxes can be derived within this system.

I also estimate these share equations with the addition of the interstate tax competition variables, COMPY and COMPGS. If there is competition on a tax-by-tax basis with neighboring states, these coefficients should be significant. This alternative specification represents an initial attempt at measuring this influence.

In stage two, desired total state spending, and thus, the required level of revenues to finance that spending, is chosen in a standard median voter framework. The structural equation for TN can be written as:

$$TN = h_o + h_1 MEDINC + h_2 MEDZ + h_3 TXSHY + h_4 TXSHGS + h_5 TXSHSS + et_n \quad (4.6)$$

By substitution, the equation to be estimated becomes:

$$TN = d_o + d_1 VANM \text{ or } VANM1 + d_2 VAM1 + d_3 BPY + d_4 BPGS + d_5 TEMP + d_6 BPF + d_7 MEDINC + d_8 MEDZ + et_n \quad (4.7)$$

where the reduced form coefficients can be defined as:

$$d_o = (h_o + h_3 a_o + h_4 b_o + h_5 c_o)/z \quad (4.8)$$

$$d_1 = (h_3 a_1 + h_4 b_1 + h_5 c_1)/z \quad (4.9)$$

$$d_2 = (h_3 a_2 + h_4 b_2 + h_5 c_2)/z \quad (4.10)$$

$$d_3 = (h_3 a_3 + h_4 b_3 + h_5 c_3)/z \quad (4.11)$$

$$d_4 = (h_3 a_4 + h_4 b_4 + h_5 c_4)/z \quad (4.12)$$

$$d_5 = (h_3 a_6 + h_4 b_6 + h_5 c_6)/z \quad (4.13)$$

$$d_6 = (h_3 a_7 + h_4 b_7 + h_5 c_7)/z \quad (4.14)$$

$$d_7 = h_1/z \quad (4.15)$$

$$d_8 = h_2/z \quad (4.16)$$

where $z = 1 - h_3 a_5 - h_4 b_5 - h_5 c_5$.

Similarly, the estimated equation for FN becomes:

$$FN = f_o + f_1 VANM \text{ or } VANM1 + f_2 VAM1 + f_3 BPY + f_4 BPGS + f_5 TEMP + f_6 BPF + f_7 MEDINC + f_8 MEDZ + ef_n \quad (4.17)$$

The median voter's tax burden is a function of the total net burden costs associated with state taxing policy, and his share of these total costs. Therefore, tax exporting does influence the median voter's tax price. The determinants of the marginal costs of various tax sources represent this influence on price.

Underlying the initial change in tax levels from T* to T' in Figure V, due to the increase in MC_2, is a corresponding change in the tax rates and/or bases used for each tax. Therefore, as shares change, so will the median voter's tax burden for a given level of spending, E*. The resulting change in desired spending depends on the change in total net burden costs versus the change in the median voter's share of these costs. If desired expenditures fall to E' in the median voter model, all taxes will now be used less, as from point C to point D. Equations (4.7) and (4.17) capture the effect of this decrease in desired spending on total per capita revenues.

Combining the two stages of the model, I am now able to estimate the reduced form effects of a change in the marginal net burden costs on a state's revenue structure. Given the response of the median voter, the final tax mix is determined. In terms of Figure V, as desired spending decreases to E' due to the increase in MC_2, required tax revenues are less. The resulting tax mix is represented by point D. Substituting equation (4.7) into each of the share equations, this movement from point A to point D is estimated for each tax. The final equilibrium is reached, as the combination of the price effect of stage one, given TN constant, and the revenue effect of stage two, given the change in the announced relationship between taxes from the initial stage.

Notice that in this framework, the median voter does

not have to be an itemizer for a change in the marginal net burden costs to influence desired state spending. Theoretically, the median voter's tax price is a function of both the total net burden costs, and his share of these costs. As the elimination of the federal offset provision for one tax source increases the marginal net burden costs of that tax, there is the initial stage one adjustment in the announced revenue structure. State policymakers choose to use that tax less to finance the given level of spending. Because a change in tax shares in stage one implies an underlying change in the base and/or rate structures of the taxes involved, the median voter's share of state taxes should also change. If, given the level of required revenues in the state, revenue raising becomes more costly as the loss in private net residential income increases, and the median voter's share of these costs increases as his share of taxes paid increases, desired state spending will fall, regardless of whether or not the median voter is an itemizer. Tax exporting influences desired spending in stage two, through its stage one influence on the revenue mix. So the demand for government services and the revenue structure chosen to finance that demand must both be considered when analyzing fiscal issues of state and local governments.

Estimation of all the equations presented is done initially in an ordinary least squares framework. Given the nature of the data, however, the total per capita tax

variable is correlated with the OLS error terms in the individual tax share equations. Therefore, I also estimate the model using two stage least squares.

In the first stage, the reduced form equation for TN (equation 4.7) is estimated using ordinary least squares. From this regression, the fitted values of total taxes per capita, FITN, are determined. FITN will by construction be linearly related to all the predetermined variables in the system and independent of the error terms in the tax share equations.

In the second stage regression, the tax share equations of the structural model (equations 4.2 through 4.4) are estimated by replacing TN with the first stage fitted variable, FITN. The use of OLS in this second stage will estimate the tax share parameters consistently. For comparison, the results from this two stage least squares technique are presented along with the OLS results.

A more ambitious estimation might involve not only the simultaneous model of tax shares and spending, but also the effects of a state's tax mix on the median voter's individual tax burden. Once this influence is measured, it may enter the total revenue equations as the median voter's individual tax price. It is through this price that tax shares influence desired state spending in the theoretical model. This would entail a three-tiered estimation procedure for the full model, with a state-by-state empirical measure of the median voter's tax price for state

government services. Because the accurate estimation of this price essentially involves the specific rate and base definitions underlying a given tax share change, along with the exporting factors, I leave this alternative specification for future research. As the structural features of specific taxes become endogenous both theoretically and empirically, this tax price can be estimated.

4.4 CONCLUSION

Now that the empirical determinants of a state's chosen tax structure have been identified, and the framework for estimation has been outlined, the role of economics in optimal state tax design can be investigated. Theoretically, economic factors should matter. Empirically, the stage has been set to test the hypothesized model. The results of the estimation presented in the next chapter suggest the applicability of this model to a state's fiscal process.

CHAPTER IV

FOOTNOTES

[1] All of the data used are presented either within the text or in Appendix A.

[2] The median voter's individual tax burden is represented by this individual's share of the loss of state private resources due to the state's chosen tax mix. Specifically, this is written as $d_k \sum_i BC_i$. Since, from equation (3.9),

$$BC_i = (1-h_i)T_i$$

as total taxes from tax i increases, BC_i increases. Therefore, the median voter's individual tax burden depends in part on the state's tax mix. Once optimal spending is chosen based on the relationship between expenditures and state tax shares, the median voter's final tax burden will also be defined.

[3] From equation (3.4),

$$\sum_i T_i + Z = E$$

where $\sum_i T_i$ equals total non-debt current state revenues and Z represents exogenous federal aid. $\sum_i T_i$ includes revenues from both taxes and user charges. Because total taxes are the main component of these revenues, an increase in desired spending most likely implies an increase in total tax revenues.

[4] With combined state and local data, factors unique to the local government level, and the degree of fiscal federalism in each state, both become important. When a heavy share of state and local financial responsibilities rests with the state alone, state spending and taxing is relatively higher than when local governments are significant. Because generally, it is state governments which specify which taxes are available for local government use, I have chosen to concentrate solely on the state fiscal structure alone.

[5] Total population by state, for 1980, was taken from the Statistical Abstract of the United States, 1984, U. S. Department of Commerce, Bureau of the Census.

[6]For evidence of this, see Zimmerman, 1983.

[7]Defining p_i as the proportion of itemizers for each tax i also results in endogeneity.

[8]See ACIR, 1982a, page 11.

[9]The average burden price in this case becomes:

$$BP_i = c_i(1-v)/(1-vt_i) + (1-c_i)$$

where t_i is the average marginal state personal income tax rate.

[10]This was obtained from the U. S. Department of Treasury, Office of Tax Analysis. The tax rate was calculated for joint returns counted twice.

[11]These rates are calculated to reflect a state's taxing practices independent of the income distribution in that state. See Feenberg and Rosen, 1985. I also calculated the burden prices using the state mtr at $40,000 AGI. This formulation was not significantly different from BPY as computed here.

[12]See Phares, 1980. Estimates by tax were provided by Phares separately.

[13]From equation (3.9), the change in total burden costs due to a change in the average burden price of a tax depends on the price change versus the change in total revenues raised through that tax source.

[14]See Phares, 1980.

[15]See McLure, 1967 and 1981.

[16]See McLure, 1967.

[17]Ibid.

[18]Ibid.

[19]Ibid.

[20]See Phares, 1980.

[21]Total state personal income by state, for 1982, was taken from the Statistical Abstract of the United States, 1984, U. S. Department of Commerce, Bureau of the Census.

[22]See Phares, 1980.

[23]See Hettich and Winer, 1984.

[24]This is similar to the model of infrequent price changes in market structure theory. To carry this further would require a general equilibrium model of interstate tax competition, as states react to each other's behavior. I will leave this extension for further research.

[25]The number of households across states for 1980, was taken from the Statistical Abstract of the United States, 1984, U. S. Department of Commerce, Bureau of the Census.

CHAPTER V

OPTIMAL STATE TAX POLICY: RESULTS AND IMPLICATIONS

The empirical results of the hypothesized general fiscal model are shown in this chapter. Now that the determinants of tax exporting have been identified, I estimate their effects on a state's chosen tax structure directly, using a cross sectional approach of actual state tax shares. From this estimation, the importance of exporting in defining optimal state tax policy becomes evident.

The results of the stage one estimation are presented in Section one. Using the monopoly bureaucrat framework, the relationship of tax shares to desired spending is defined based on a state's exporting potential. Given this information, the median voter then chooses optimal state spending in stage two. These results are detailed in Section two.

Once optimal state spending is defined, the required revenues to finance that spending are also defined. So the reduced form influence of this spending choice on a state's final revenue mix is discussed in Section three. The suggested implications of these results in light of the

current debate on federal tax reform are discussed in Section four.

5.1 TAX SHARES IN A MONOPOLY BUREAUCRAT MODEL

The results of the stage one OLS estimation of the influence of exporting on a state's chosen tax structure are presented in Tables V through VIII, for the individual income, general sales, selective sales and other tax shares respectively. The results of the TSLS estimation are presented in Tables IX and X. As shown, the shifting of taxes to nonresidents through both the price/migration effect and the federal offset appears to be a significant determinant of the relative use of certain taxes. Interpreting the estimated coefficients, exporting does play a role in defining optimal state taxing policy.

5.1.1 PRICE/MIGRATION EXPORTING

The shifting of taxes to out-of-state consumers or factor owners through the price/migration effect occurs across three different sectors of a state's economy, manufacturing, mining, and tourism. The importance of each of these influences on alternative tax shares is measured through VANM and VANM1, VAM1, and TEMP respectively. Overall, the results suggest that this source of exporting does help to explain the variation in revenue structures across states.

TABLE V

INCOME TAX SHARES: STAGE ONE OLS RESULTS

	(1)	(2)	(3)
INTERCEPT	.6127 (.4546)	.3379 (.4675)	.2578 (.4581)
VANM	.0739 (.1567)	--	--
VANM1	--	.4580* (.2552)	.3374 (.2579)
VAM1	-.0128 (.0702)	.0269 (.0716)	-.0074 (.0724)
BPY	-1.099** (.1027)	-1.091** (.0970)	-1.077** (.0949)
BPGS	.6820 (.4505)	.5407 (.4405)	.5317 (.4297)
TN	-.000078** (.00003)	-.000092** (.00003)	-.000076** (.00003)
TEMP	-.00135 (.0014)	-.00121 (.0013)	-.00154 (.0013)
BPF	--	--	.2201* (.1230)
R^2	.8115	.8237	.8362
F-statistic	30.85	33.49	30.63

*Indicates significance at the 90 percent level for a two-tailed test.

**Indicates significance at the 95 percent level for a two-tailed test.

TABLE VI

GENERAL SALES TAX SHARES:
STAGE ONE OLS RESULTS

	(1)	(2)	(3)
INTERCEPT	1.916**	2.210**	2.186**
	(.6098)	(.6350)	(.6445)
VANM	-.0552	--	--
	(.2103)		
VANM1	--	-.4798	-.5159
		(.3467)	(.3628)
VAM1	-.1982**	-.2403**	-.2505**
	(.0942)	(.0972)	(.1019)
BPY	.7465**	.7351**	.7395**
	(.1378)	(.1317)	(.1336)
BPGS	-2.545**	-2.401**	-2.404**
	(.6044)	(.5983)	(.6044)
TN	.00005	.000064	.000069
	(.00004)	(.00004)	(.00004)
TEMP	.0036*	.0035*	.0034*
	(.0019)	(.0018)	(.0019)
BPF	--	--	.0658
			(.1730)
R^2	.5954	.6121	.6134
F-statistic	10.55	11.31	9.52

*Indicates significance at the 90 percent level for a two-tailed test.

**Indicates significance at the 95 percent level for a two-tailed test.

TABLE VII

SELECTIVE SALES TAX SHARES:
STAGE ONE OLS RESULTS

	(1)	(2)	(3)
INTERCEPT	-.6406*	-.7428*	-.7675**
	(.3548)	(.3778)	(.3821)
VANM	-.0830	--	--
	(.1223)		
VANM1	--	.1228	.0856
		(.2062)	(.2150)
VAM1	-.1911**	-.1784**	-.1890**
	(.0548)	(.0578)	(.0604)
BPY	.2943**	.3126**	.3171**
	(.0802)	(.0784)	(.0792)
BPGS	.6466*	.6281*	.6253*
	(.3516)	(.3559)	(.3583)
TN	.000036	.000033	.000038
	(.000023)	(.000024)	(.000025)
TEMP	-.00027	-.00035	-.00046
	(.0011)	(.0011)	(.0011)
BPF	--	--	.0679
			(.1026)
R^2	.4862	.4850	.4903
F-statistic	6.78	6.75	5.77

*Indicates significance at the 90 percent level for a two-tailed test.

**Indicates significance at the 95 percent level for a two-tailed test.

TABLE VIII

OTHER TAX SHARES:
DERIVED STAGE ONE OLS RESULTS

	(1)	(2)	(3)
INTERCEPT	-.8881 (.8392)	-.8051 (.8743)	-.6763 (.8782)
VANM	.0643 (.2894)	--	--
VANM1	--	-.1010 (.4773)	.3675 (.4943)
VAM1	.4021** (.1296)	.3918** (.1339)	.4469** (.1388)
BPY	.0582 (.1897)	.0433 (.1814)	.0204 (.1820)
BPGS	1.216 (.8318)	1.232 (.8238)	1.247 (.8236)
TN	-.000008 (.00006)	-.000005 (.00006)	-.000031 (.00006)
TEMP	-.0020 (.0026)	-.0019 (.0025)	-.0014 (.0025)
BPF	--	--	-.3538 (.2357)

*Indicates significance at the 90 percent level for a two-tailed test.

**Indicates significance at the 95 percent level for a two-tailed test.

TABLE IX

STATE TAX SHARES: TSLS RESULTS EXCLUDING BPF

	TXSHY	TXSHGS	TXSHSS	OTHER
INTERCEPT	.3994	2.221**	-.7759**	-.8445
	(.4964)	(.6576)	(.3843)	(.9091)
VANM1	.5541*	-.4629	.0711	-.1623
	(.2932)	(.3884)	(.2271)	(.5369)
VAM1	.1185	-.2241	-.2277**	.3333
	(.1364)	(.1807)	(.1056)	(.2498)
BPY	-1.155**	.7239**	.3471**	.0840
	(.1291)	(.1711)	(.1000)	(.2365)
BPGS	.4822	-2.412**	.6596*	1.270
	(.4678)	(.6198)	(.3622)	(.8568)
FITN	-.00014**	.000057	.000056	.000027
	(.000062)	(.000081)	(.000048)	(.00011)
TEMP	-.0015	.0035*	-.00018	-.0018
	(.0014)	(.0019)	(.0011)	(.0027)
R^2	.8060	.5938	.4794	--
F-statistic	29.77	10.48	6.60	--

*Indicates significance at the 90 percent level for a two-tailed test.

**Indicates significance at the 95 percent level for a two-tailed test.

TABLE X

STATE TAX SHARES: TSLS RESULTS INCLUDING BPF

	TXSHY	TXSHGS	TXSHSS	OTHER
INTERCEPT	.3379	2.184**	-.8317**	-.6902
	(.4862)	(.6774)	(.3942)	(.9223)
VANM1	.4528	-.5142	-.0085	.0699
	(.3129)	(.4360)	(.2537)	(.5936)
VAM1	.0866	-.2512	-.2650**	.4296
	(.1508)	(.2101)	(.1222)	(.2860)
BPY	-1.145**	.7426**	.3711**	.0313
	(.1339)	(.1866)	(.1086)	(.2541)
BPGS	.4844	-2.407**	.6646*	1.258
	(.4497)	(.6266)	(.3647)	(.8531)
FITN	-.00012*	.000070	.000073	-.000023
	(.000069)	(.000096)	(.000056)	(.00013)
TEMP	-.0018	.0034*	-.00026	-.0013
	(.0014)	(.0019)	(.0011)	(.0027)
BPF	.1678	.0648	.1106	-.3432
	(.1474)	(.2054)	(.1195)	(.2796)
R^2	.8249	.5945	.4846	--
F-statistic	28.26	8.80	5.64	--

*Indicates significance at the 90 percent level for a two-tailed test.

**Indicates significance at the 95 percent level for a two-tailed test.

Manufacturing and Mining

As expected, the measure of state dominance in manufacturing, VANM, is not a significant determinant of tax shares across states. No one state really dominates enough for the forward shifting of a tax to nonresident consumers. With state dominance such a small factor in any state's industrial profile, and with constitutional restrictions against isolating any one industry on the basis of tax policy, taxing all output more intensively to benefit from this minor source of exporting does not seem reasonable. VANM1, on the other hand, is significantly positive in the income tax share equation. Even though this is counter to initial expectations, a plausible interpretation can be offered within the context of the model.

Given the lack of substantial state dominance across states, the exporting of state taxes on industrial production seems limited to the burden placed on nonresident factor owners as these taxes are absorbed by profits on capital or shifted backwards to less mobile factors. In the long run, capital is extemely mobile between states and industries, and therefore, is likely to avoid the burden of these taxes. The less mobile factors, land and labor, bear the majority of the burden.

In the short run, capital is largely committed and effectively immobile across industries. But that does not imply that it is also primarily immobile across states.

Regardless, state policy that would tax certain industrial production relatively more intensively than other tax bases in order to take advantage of exporting through out-of-state capital owners would run the risk of base erosion in the long run, and maybe even in the short run. New investment in the taxed industries would be curtailed, existing capital would flow out of the state, and employment opportunities would dwindle, all contracting the initial tax base. Weighing the possible short run benefits of tax exportation against the long run costs of losing a nationally marketed industry, a public official will opt to tax production of the state's primary industries less intensively relative to other tax sources.

A good example of this is the refining of petroleum products in Texas.[1] To the casual observer, a tax on this industrial processing might appear to be easily shifted forward to out-of-state consumers. But since, on an international basis, Texas no longer dominates the market for crude oil or petroleum products, this is not likely to occur. A tax on this industry is exported, mainly to the extent that the owners of the Texas refineries are nonresidents.

In the past, refining crude oil was probably tied very closely to the areas where that oil was produced. Economies of scale dictated the location of refineries near the sources of supply. But recent advancements in transportation technology and market growth "...have made

the refining industry 'relatively footloose.'"[2] Now it makes little difference whether crude oil refining takes place near the source of supply, near the markets, or somewhere in the middle. The cost differential of transporting crude versus transporting the refined products is negligible.

Therefore, a state tax on the industrial processing of crude oil and petroleum products in Texas could easily influence both the short run decision of where to refine a given quantity of crude oil and the long run decision of where to locate new refineries and expand existing capacity. So even though in the short run there is some chance of exporting a tax on refining in Texas, mainly through nonresident owners of Texas refineries, in the long run that tax might not even be collected, much less exported, due to the erosion of the industrial base. As the results suggest, VANM1 is positively related to the share of income taxes in total tax receipts.

To the extent that general sales taxes include revenues from business gross receipts taxes, VANM1 is negatively related to the use of general sales taxes. Income taxes and general sales taxes are substitutes for each other in relation to state business taxes. Given a fixed level of revenues, income tax levels increase 19.7 percent and general sales tax receipts fall 13.2 percent as the share of manufacturing for national markets increases ten percent.[3] "Other" tax sources, which include these other

production based taxes, are also used less intensively.[4]

The situation is not the same for the mineral based industries, however. The conditions which govern the influence of taxes on the extraction of natural resources are much different than those that define the influence of a tax on the processing of that resource. In the short run, severance taxes are largely borne by the recipients of rents, including any quasi-rents accruing to labor and capital in the taxed industry, and resource rents received by the owners of the mineral rights. In the long run these taxes accrue mainly to the recipients of resource rents. Therefore, taxes on extractions are thought to have a small effect on output relative to the devastating effects of heavy taxes on manufacturing.[5] Because the tax base is not mobile in this case, and severance taxes are easily exported, taxes on the extraction of resources will be used much more intensively relative to other tax sources.

As Tables V through VIII show, VAM1 is negative and significant in the general sales and selective sales tax share equations. The TSLS results indicate significance only for selective sales. Severance taxes are substitutes for sales taxes in this estimation, but not for the individual income tax. And "other" taxes, which include severance taxes, are positively related to VAM1. Given a constant level of revenues, sales taxes are used relatively less and severance taxes are used relatively more as the mineral base accounts for a larger share of a state's

economy. The potential to export in this manner is a dominant influence on tax shares, due to an immobile tax base. The potential to export manufacturing based taxes is not as influential, due to the mobility of the productive resources.

Tourism

As a measure of a state's potential to export taxes through its tourist trade, TEMP is positively related to general sales tax shares across states. The greater the flow of nonresident consumers into a state, the greater the potential to export consumption based taxes. So these taxes will be used relatively more in comparison to all other tax sources.

User Fees

Adding BPF to the respective tax share equations suggests that state user fees and individual income taxes may be substitutes for each other in a state's revenue structure. To the extent that BPF measures the resident's share of state current charges, as BPF increases, a state's reliance on income taxes to finance a given level of revenues also increases. Specifically, the TSLS results suggest that a ten percent increase in BPF increases TXSHY by 5.9 percent.[6] Holding total revenues constant, this implies that the use of current charges as a source of revenue must fall. The inclusion of this variable does not significantly alter the other results.

TABLE XI

FED OFFSET ELASTICITIES: STAGE ONE

	TXSHY	TXSHGS	TXSHSS	OTHER
BPY	-3.70	1.87	1.43	0.26
BPGS	1.84	-7.42	3.25	4.78

5.1.2 FEDERAL OFFSET EXPORTING

The potential to shift part of the state tax burden to federal taxpayers occurs through federal deductibility provisions. State individual income and general sales taxes both benefit from this offset capacity, selective sales taxes generally do not. To the extent that BPY and BPGS measure this exporting potential across states, the results presented in Tables V through X suggest that the federal deductibility of state taxes does influence actual tax shares across states.

As the net burden price of the individual income tax increases, the share of income taxes in total tax receipts falls. Given a constant level of required revenues, general sales taxes, selectives sales taxes, and all other tax sources will be used more intensively. Taxes are substitutes for each other on the basis of the federal offset. Likewise, as the net burden price of the state general sales tax increases, these taxes are used relatively less and all other taxes are used relatively

more, all else constant. Table XI presents the implied own and cross price elasticities of this stage one estimation based on the TSLS results.

5.1.3 TOTAL TAXES PER CAPITA

Theoretically, as the marginal costs of alternative tax sources increase at differing rates, an increase in required revenues will alter the existing levels of taxes such that the corresponding shares of each of these taxes in total tax receipts will not remain constant. Because TN is negatively related to state individual income tax shares, but positively related to both sales tax shares, the results support this theoretical observation. The marginal costs of state sales taxes must increase at a slower rate relative to other tax sources. The share of total tax receipts from both the general and selective sales tax increases as TN increases based on the OLS results. Vice versa, the marginal costs of the state individual income tax must increase at a faster rate relative to other tax sources, because its share decreases as TN increases. In fact, a ten percent increase in total taxes per capita decreases TXSHY by 3.1 percent, increases TXSHGS by 1.7 percent, and increases TXSHSS by 1.4 percent, all else held constant. All other taxes fall by 0.16 percent. By comparison, the TSLS coefficient on the fitted value of TN, FITN, is significantly negative in the income tax share equation. A ten percent increase in FITN decreases TXSHY by 4.6 percent.

If, as theoretically postulated, the further down into less desirable tax bases a state has to go, the more costly revenue raising becomes, then the marginal cost of a tax increases as total revenues increase. Given this, the results presented here imply that the base for the individual income tax responds to a change in its rate structure at a relatively quicker pace than does the own rate response of the sales tax base. To the extent that an individual's sales tax burden is more illusive than the individual income tax burden, it seems plausible that income taxes influence behavior to a greater extent. Therefore, as the size of the state public sector increases, taxes other than the individual income tax tend to be used relatively more to finance desired spending. State individual income taxes are inferior.

5.1.4 INTERSTATE TAX COMPETITION

Including the variables that measure interstate tax competition on a tax-by-tax basis across neighboring states does not seem to add explanatory power to the tax share equations estimated. As shown in Table XII, COMPGS is significantly positive only in the income tax share equation.

However, cross equation restrictions suggest that the effect of COMPGS on TXSHY may be offset across all the other equations as a group rather than individually through the general sales tax. By conducting an F test on the tax share equations including and excluding these interstate

TABLE XII

TAX SHARES AND INTERSTATE COMPETITION:
STAGE ONE OLS RESULTS

	TXSHY	TXSHGS	TXSHSS	OTHER
INTERCEPT	.2049	2.568**	-.8139**	-.9590
	(.4690)	(.6431)	(.3983)	(.8900)
VANM1	.4987**	-.4858	.1042	-.1171
	(.2468)	(.3384)	(.2096)	(.4684)
VAM1	-.0406	-.2188**	-.1520**	.4114**
	(.0777)	(.1065)	(.0660)	(.1474)
BPY	-1.045**	.7605**	.2788**	.0057
	(.1016)	(.1393)	(.0863)	(.1928)
BPGS	.5279	-2.600**	.7119*	1.360
	(.4372)	(.5995)	(.3714)	(.8298)
TN	-.000054	.000032	.000025	-.000003
	(.000033)	(.000045)	(.000028)	(.000063)
TEMP	-.00176	.00304	.00012	-.0014
	(.0014)	(.0019)	(.0012)	(.0027)
COMPY	-.0126	-.2278	.0956	.1448
	(.1219)	(.1672)	(.1036)	(.2314)
COMPGS	.2830**	-.2696	-.0406	.0272
	(.1218)	(.1671)	(.1035)	(.2312)
R^2	.8442	.6507	.4972	--
F-statistic	27.78	9.55	5.07	--

*Indicates significance at the 90 percent level for a two-tailed test.

**Indicates significance at the 95 percent level for a two-tailed test.

competition variables, the joint significance of COMPY and COMPGS can be determined. The appropriate F statistics that test the hypothesis that COMPY and COMPGS are jointly equal to zero clearly do not exceed the critical value of the F distribution at the five percent level for any of the estimated equations. Therefore, interstate tax competition on the basis of neighboring shares does not appear to be significant.

Given the relatively basic structure of this model, it appears that states may not compete on the basis of overall tax structure. But because there exist many tax rate and base combinations that define a given mix, whether the competition occurs on the basis of shares, or actual rates and bases chosen, cannot be determined here. If the structural features of taxes are made endogenous, a more vigorous attempt can be made to address this issue in general equilibrium terms, given the reaction functions of rival states.

5.2 STATE SPENDING IN A MEDIAN VOTER MODEL

Given the results of the stage one estimation, the median voter now becomes important. Interpreting the information on tax shares provided by the state, this individual now chooses desired state spending, and thus, the revenues required to finance that spending. The results of this stage two OLS estimation are presented in Table XIII. Overall, the model does an adequate job of

TABLE XIII

REQUIRED PER CAPITA REVENUES:
STAGE TWO RESULTS

	TN		FN
	(1)	(2)	
INTERCEPT	-4545**	-3779	-93.4
	(2610)	(2663)	(357.9)
VANM1	2240*	2527**	165.6
	(1112)	(1128)	(151.6)
VAM1	1522**	1599**	27.2
	(269)	(274)	(36.9)
BPY	-686	-750	-91.71
	(456)	(456)	(61.2)
BPGS	1699	1515	382.3
	(2128)	(2118)	(284.7)
TEMP	4.69	4.78	-.1619
	(6.81)	(6.76)	(.9091)
BPF	--	-704	-277.3**
		(560)	(75.24)
MEDINC	.0865**	.0791**	.00065
	(.025)	(.026)	(.0034)
MEDZ	.4617*	.3872	.0358
	(.252)	(.258)	(.0346)
R^2	.8667	.8717	.4996
F-statistic	39.02	34.81	5.12

*Indicates significance at the 90 percent level for a two-tailed test.

**Indicates significance at the 95 percent level for a two-tailed test.

explaining per capita receipts.[7]

5.2.1 EXPORTING AND THE MEDIAN VOTER'S TAX BURDEN

As the marginal net burden costs of a particular tax increase, either through the price/migration effect or the federal offset, a state tends to use that tax source less intensively for a given level of required revenues. The relationship between alternative tax sources changes in stage one. Because the median voter's individual tax price is defined as this voter's share of total net burden costs, desired spending, and the revenues required to finance that spending, will also be influenced by exporting. As this announced tax relationship changes, total net burden costs and the median voter's share of these costs also change. The determinants of the marginal net burden costs of alternative tax sources are important in the median voter model to the extent that they represent this stage one adjustment in a state's tax mix.

It is generally accepted that state individual income taxes are proportional to progressive, whereas state sales taxes are proportional to regressive. Therefore, a change in the announced tax structure towards the more intensive use of individual income taxes relative to the general sales tax implies that the median voter's share of total taxes in the state may actually decline. Likewise, if general sales taxes are substituted for income taxes, this individual's share of total taxes should increase.

Given this, from stage one an increase in VANM1

suggests that states will use income taxes and selective sales taxes proportionately more, and all other taxes, including the general sales tax, proportionately less for a given level of total revenues. If this implies a decrease in the median voter's share of total taxes, desired spending will increase. As an increase in the potential to export production-based taxes also decreases the total net burden costs of the state's revenue mix, the median voter's tax burden falls even more, reinforcing the increase in required state revenues. VANM1 is positive in the revenue equations as state spending becomes less costly in terms of private income sacrificed. In fact, not only do total revenues increase, but the share of those revenues raised from taxes also increases relative to the share from user charges. A ten percent increase in VANM1 increases TN by 27 percent, while FN rises by only 12.5 percent.[8]

Similarly, as VAM1 increases, a state will respond by raising a greater relative share of revenues from severance taxes, using sales taxes proportionately less. Again, the median voter's share of total burden costs should fall, along with total net burden costs. So using the information provided in stage one, the median voter interprets the change in the tax structure relationship due to an increase in VAM1 as a decrease in his individual tax price. Desired state spending, and the resources required to finance that spending, will increase as state government services become less costly. VAM1 is positive in both

revenue equations, significantly positive for TN. A ten percent increase in VAM1 increases total per capita tax revenues by 2.7 percent.

The burden prices for the individual income and general sales taxes must be interpreted in the same framework. From the stage one estimation, as BPY or BPGS changes, the state's tax mix also changes, all else constant. Using the estimated coefficients from these tax share equations, the implied effects of this change on a state's total net burden costs can be calculated. Focusing on the total burden costs of these taxes defined only by federal deductibility,

$$\sum_i BC = [(BPY)T_y] + [(BPGS)T_{gs}] + T_{ss} \qquad (5.1)$$

where T_y, T_{gs}, and T_{ss} represent the tax receipts from the income, general sales, and selective sales tax respectively. Therefore, the change in total burden costs due to a change in BPY becomes:

$$d(\sum_i BC)/dBPY = [T_y(1+E_y)] + [BPGS(\partial T_{gs}/\partial BPY)] + \partial T_{ss}/\partial BPY \qquad (5.2)$$

where E_y represents the own price elasticity of the individual income tax.[9] Using the TSLS results from the estimation in stage one, total burden costs defined only through the federal offset component increase 4.2 percent for every ten percent increase in BPY.

Combining this increase in total burden costs with the hypothesized increase in the median voter's share of total taxes as sales taxes are used relatively more than

individual income taxes, it is speculated that the median voter's individual tax price would increase with an increase in BPY. As state spending becomes more costly, desired spending falls and required revenues also decline accordingly. BPY is negative in the revenue equations modeled. Specifically, a ten percent increase in BPY decreases TN by 7.2 percent and decreases FN by 6.2 percent. Total spending falls, along with total taxes relative to user fees as a source of revenues.

Following a similar analysis, a ten percent increase in BPGS actually decreases total net burden costs almost thirteen percent when these costs are defined only through the federal offset component. As noted earlier, the deductibility of the individual income tax dominates that of the general sales tax in explaining the federal offset potential across states. Because on average, BPGS is almost twenty percent higher than BPY to begin with, the shifting of a state's tax burden through general sales tax deductibility is small relative to the federal offset of the individual income tax. Whereas with an increase in BPY, tax shares change such that the sales taxes almost fully adjust for the decline in the use of the income tax, with an increase in BPGS, general sales tax use responds so strongly that all other taxes must increase in order to maintain a constant level of total revenues. Summing the coefficients on BPGS across the three share equations, the share of "other" taxes in total tax revenues increases 48

percent for a ten percent increase in BPGS.

Therefore, a one percent increase in BPGS decreases the share of general sales taxes in total tax revenues by over seven percent, increases the share of all other taxes to hold total receipts constant, and decreases total net burden costs defined solely through federal deductibility. But only if the average marginal net burden price of one dollar raised from all other taxes defined across all other sources of exporting is less than 0.74, will total burden costs actually fall. Because on average, about twenty percent of these other taxes are shifted across states, generally, as BPGS increases, total net burden costs should also increase.[10] Holding the median voter's share of these costs constant, this individual's tax price will increase. State government services become more costly to this voter in terms of private net income sacrificed.

But as argued above, the significant decline in TXSHGS matched with the increase in the use of all other taxes, including the individual income, corporate net income, and severance tax, should decrease the median voter's share of state taxes. Therefore, this individual's tax price will fall, all else constant. The combination of these two opposing influences suggests an explanation as to why the coefficient on BPGS is positive but not strongly significant in the revenue equations. Because a ten percent rise in BPGS increases per capita user fees 3.1 percent, with no significant influence on TN, the share of

required revenues from total taxes falls relative to current charges.

Similarly, as an increase in TEMP implies an increase in the reliance on general sales taxes relative to all other taxes in a state's revenue profile, again the median voter's share of the state tax burden increases. But the greater the tourist flow for a state, the lower the total net burden costs of the total revenues collected. As these two effects work against each other in determining the net effect on the median voter's tax price, the influence of TEMP on the required revenues dictated by the level of chosen state spending is indeterminate. This coefficient is insignificant in both revenue equations.

Overall, the interpretation of the exporting components in this stage two estimation is admittedly conjectural. Once the structural features of particular taxes become endogenous, the effects of the changes in the tax share relationship on the median voter's individual tax price can be examined in more detail. The impact of the implied rate and/or base changes underlying the adjustments in the share equations should become more evident. Until then, the interpretation of the results of the changes in the marginal net burden costs of state taxes on total required revenues remains speculative, but plausible.

5.2.2 MEDIAN INCOME AND GRANTS

From the results in Table XIII, median family pre-tax income has a positive and significant influence on total

desired spending. A ten percent increase in MEDINC increases TN by 15.9 percent in the model estimated here. Likewise, a ten percent increase in MEDZ increases required tax revenues by 4.3 percent and increases FN by 2.8 percent. One dollar received by the private sector has less of an effect on total public spending than one dollar received by the state in the form of federal government aid. Given that state government expenditures increase proportionately more than an increase in MEDINC, and that an increase in MEDZ not only increases desired spending, but it also increases taxes and user fees, state government services are considered public sector superior.

5.2.3 BPF

To the extent that an increase in BPF represents an increase in the median voter's individual tax price, the negative influence on both TN and FN is as expected. From the stage one estimation, a decline in the potential to export user fees implies a relatively greater share of revenues raised through the state individual income tax. With this response, total net burden costs in the state should increase. If using current charges less and income taxes more to raise a given level of revenues implies an increase in the median voter's share of total burden costs in the state, then this individual's tax price will also increase.

From Table XIII, a ten percent increase in BPF results in a 20.8 percent decline in per capita revenues from

current charges and a 7.4 percent fall in total taxes per capita. Not only does desired spending decline, dictating a corresponding fall in total required revenues, but user fee revenues fall proportionately more than taxes. As BPF increases, the share of total revenues from current charges falls as taxes are used relatively more intensively.

5.3 TAX SHARES IN THE COMBINED FISCAL MODEL

Now that both fiscal decisions have been estimated in this two stage framework, the combined influence of the two choices on the resulting state tax mix can be calculated. Incorporating the price effect of stage one, given TN constant, with the revenue effect of stage two, given the change in the announced tax share relationship from stage one, the net effect is derived. Theoretically, E_y now becomes:

$$E_y = [(\partial TXSHY/\partial BPY)(BPY/TXSHY)] + [(\partial TXSHY/\partial TN)(\partial TN/\partial BPY)(BPY/TXSHY)] \quad (5.3)$$

where the first term represents the price effect from stage one and the second term is the revenue effect from stage two. All own and cross price elasticities can now be defined in a similar manner. Specifically, substituting the estimated equation for FITN into each of the tax share equations results in the reduced form elasticities presented in Table XIV.[11]

Comparing these estimates to the results from stage one alone, the influence of exporting on a state's revenue mix

TABLE XIV

TAX SHARE ELASTICITIES IN THE COMBINED MODEL

	TXSHY	TXSHGS	TXSHSS	OTHER
VANM1	0.85	-0.96	--	--
VAM1	--	-0.06	-0.10	0.20
BPY	-3.39	1.77	1.28	0.21
BPGS	0.93	-7.12	3.72	4.95
TEMP	-0.47	0.66	--	--
BPF	0.94	--	--	-1.26

is reinforced or mitigated, depending on the effect of total per capita tax revenues on the respective tax levels. For example, from stage one, a one percent decrease in BPY increases the share of taxes from the individual income tax by 3.70 percent, decreases TXSHGS by 1.9 percent, decreases TXSHSS by 1.43 percent, and increases other taxes by 0.26 percent. But the stage two adjustment by the median voter now dictates an increase in total tax receipts. As total required tax revenues rise, more of the increase is in general sales and selective sales taxes rather than individual income and other taxes. Therefore, the reduced form decreases in the sales tax shares are smaller, as is the relative increase in TXSHY. Other taxes increase slightly more. Similarly, a one percent increase in BPGS

results in a smaller increase in TXSHY and other tax shares, a smaller decrease in TXSHGS, and a larger increase in TXSHSS in the combined model than in the stage one adjustment alone.

5.4 IMPLICATIONS FOR FEDERAL TAX REFORM

The implications for current federal taxing policy now become clear. All of the proposals to reform the U. S. tax code include some modification of the existing provisions for the deductibility of state and local taxes. These changes range from the full removal of the federal offset for all state and local taxes currently deductible to removing this offset provision for sales taxes only. Given the estimation results presented here, the effects of these proposals on a state's fiscal structure can now be examined in more detail.

If the reform policy adopted eliminated the deductibility of all state and local taxes currently deductible, the average federal offset burden price of both the state individual income and general sales tax would increase to one across all states. This represents a 25.9 percent increase in BPY and a 5.5 percent increase in BPGS as measured in this framework. The net impact of both of these price changes on a state's tax mix is presented in Table XV.

It should be kept in mind that the results estimated here include the price effects of only two of the four

TABLE XV

NET IMPLICATIONS FOR FEDERAL TAX REFORM

(A) Removing the federal offset for all taxes.

	Individual Income	General Sales	Selective Sales	Other
% Change	-82.7%	6.7%	53.6%	32.7%
$ Change (Per Capita)	-$173	-$7	$62	$43

(B) Removing the federal offset for general sales taxes only.

	Individual Income	General Sales	Selective Sales	Other
% Change	5.1%	-39.2%	20.5%	27.2%
$ Change (Per Capita)	$31	-$85	$50	$81

taxes influenced. Removing the federal offset provision for all state and local taxes currently deductible would also increase the average burden price of state and local property taxes. Whether these property taxes are substitutes for or complements to the other three taxes modeled, the final shares would be influenced accordingly.[12] Likewise, to the extent that business taxes remain as a deductible business expense, there may be even more of a switch towards the state corporate net income tax than what is generally suggested in the "other" tax share results. Again, the shares estimated directly would be

influenced accordingly, depending on their relationship to business taxes.

Also in Table XV are the reduced form effects on a state's revenue structure of eliminating federal deductibility for the state general sales tax only. As this provision is removed, the stage one adjustment suggests that states will now choose to use general sales taxes less intensively relative to other revenue sources in financing a given level of spending. The voting public becomes aware of this change and translates it into individual terms. The implied rate and/or base adjustments underlying this stage one change in shares results in a decline in individual tax burdens. Observing this fall in his own tax price, the median voter in the state now opts for a $77 increase in desired spending in stage two of this fiscal choice model. But because income tax receipts increase proportionately less as required tax revenues rise and sales tax receipts increase relatively more, the overall adjustment in the alternative tax shares is reinforced or lessened accordingly.

Obviously, this full adjustment process is a long run equilibrium. But revenue projections by the Treasury predict that the complete elimination of all federal offset provisions would raise an additional $33 billion in fiscal year 1987 and an extra $40 billion by 1990. Given that this change in tax rules sets in motion the tax mix modifications suggested here, these projected federal

revenue increases are overestimated.

State business taxes, as a cost of business itself, would still be deductible to the extent that all other costs are deductible business expenses. So as states switch from personal taxes to business taxes and user charges in response to this federal tax reform, they shift a portion of their financing from individuals to businesses. Now, instead of state taxes being offset in direct proportion to the federal personal income tax rate, they are shifted to the federal government in direct proportion to the federal corporate income tax rate.

On average, the federal marginal tax rate for individual itemizers is about 28 percent. Corporations, on the other hand, itemize their deductions at the 46 percent federal tax rate. A dollar of state tax revenue is offset even more now due to this state fiscal adjustment, than what was shifted prior to this change. Therefore, federal tax revenues will increase less than projected. The "revenue neutral" federal tax reform proposals are no longer revenue neutral.

By including consideration of interstate tax competition, the analysis becomes even more involved. States may respond to the elimination of the federal offset by altering their revenue mix. If states also respond to each other on the basis of tax shares or structures, then there is a second round influence on a state's revenue structure.

Eliminating the current federal deductibility provisions for all taxes results in a substantial decline in TXSHY and an increase in all other taxes, as shown in Table XV. If neighboring states respond to the fall in TXSHY by increasing their reliance on general sales taxes relative to other tax sources, then the first round movement away from individual income taxes will be strengthened even more. As neighboring states react to the increase in TXSHGS, this second round influence may be dampened, but not significantly. This effect should not be ignored when evaluating current federal tax reform proposals.

5.5 CONCLUSION

Based on the theoretical model of state fiscal behavior hypothesized, I have shown that the reduced form determinants of the marginal net burden costs of alternative state tax sources are significant factors in explaining the variation in tax shares across states. Using a cross sectional estimation, it becomes evident that the potential for tax exporting does influence a state's revenue structure. Therefore, any analysis of federal tax reform proposals must include the suggested effects of these reforms on state taxing behavior. From the state's point of view, the results presented here suggest the role of economics in defining a "good" state tax structure.

CHAPTER V

FOOTNOTES

[1] See McLure, 1978.

[2] Ibid, page 260.

[3] All elasticities are calculated at the mean, using the results from equation (2). This eliminates any uncertainty about including BPF in the estimation.

[4] This is derived by summing the coefficients on VANM1 across all share equations.

[5] See McLure, 1978.

[6] This was calculated at the mean using the estimate from equation (3).

[7] User charges were also estimated as a share equation, using (TN+FN) as total own source revenues in place of total tax receipts. The results from this formulation were not significantly different from the results reported here.

[8] To facilitate comparisons across TN and FN, I use the estimates for TN from equation (2) to calculate these elasticities. These do not differ significantly from the results of equation (1).

[9] Because:

$$BC_y = (BPY)T_y$$

$$dBC_y/dBPY = T_y + [(BPY)(\partial T_y/\partial BPY)]$$

$$dBC_y/dBPY = T_y[1+E_y]$$

[10] The shifting of all "other" taxes, along with the price/migration exporting of the three taxes modeled averages about 20 percent of total receipts for each tax, and 12 percent of total receipts across all taxes, based on Phares, 1980. Therefore, total costs should increase. If total net burden costs do decline, the drop should not be significant.

[11] I substitute equation (1) of TN into equation (2) for the alternative tax shares. This eliminates any reservations about using BPF as a measure of user fee exportability. If the t-statistic on an estimated coefficient in the first stage is less than one, I do not calculate the reduced form elasticity. For the final estimate of BPF in TXSHY and other taxes, I use specification (2) for TN.

[12] State taxes do appear to be substitutes. Whether local property taxes are a substitute for state revenue sources is not clear. Once the model has been expanded to include both the state and local sector, this question can also be addressed.

CHAPTER 6

CONCLUSION

This dissertation examines the role of tax exporting in the state fiscal choice process. It differs from previous research in several respects. First, by focusing on the major state tax sources, it provides one of the most complete studies on state revenue behavior to date. Second, this work is one of the first to develop a combined model of both taxing and spending at the state level. Ignoring the spending choice suggests that these two decisions are disjoint. But in fact, required revenues are defined by the amount of government spending and total expenditures influence the chosen revenue mix. Third, this thesis provides a detailed measure of the potential to export individual income and general sales taxes across states based on the federal offset. These calculated burden prices improve on the income distribution proxies used in earlier studies.

In general, the results obtained suggest that on the basis of exporting, state taxes are substitutes for each other as alternative sources of revenue. The principle findings are:

(1) Federal deductibility of certain state taxes not only influences desired spending through the median voter's budget constraint, it also stimulates a relatively greater reliance on these taxes due to their lower marginal net burden cost. Specifically, state taxes are substitutes for each other based on the federal offset.

(2) The potential to export manufacturing based taxes does not influence state taxing behavior as expected. The long run threat of base erosion appears to override the benefits of shifting. This results in even less of a reliance on these taxes relative to individual income taxes as a state's value added for national markets increases.

(3) A greater potential to export taxes on the extraction of natural resources results in a greater reliance on state severance taxes relative to sales taxes. Due to the very immobile base, these taxes are used relatively more intensively without the threat of base erosion in the long run.

(4) States with a substantial tourist trade tend to use consumption based taxes relatively more than other tax sources. The interstate movement of consumers across state lines decreases the marginal net burden costs of these taxes and encourages their use.

The major policy implication of these results pertains

to current federal tax reform proposals. When evaluating the effects of federal tax reform, a state's response to the elimination of existing federal deductibility provisions for certain state and local taxes includes an adjustment in their given tax structure, as those taxes become more costly sources of revenue. This response must be recognized in order for any evaluation to be accurate.

This thesis also raises many questions for further research. The main focus throughout the work presented here has been on the residential burden costs of a given tax net of exporting. But as theoretically hypothesized, both transactions costs and excess burden costs may also be important. This becomes significant, more for a rate and/or base structural choice than for tax shares. If I allow the specific structural features of certain taxes to be endogenous also, I can extend the research in this direction. Equity concerns would now be included, along with the efficiency costs. And the impact of the explicit rate and/or base changes on the median voter's individual tax burden would now be understood with more certainty.

Interstate competition is another issue for further pursuit. The results of this thesis suggest that states may not compete with each other on the basis of tax shares. But this specification was restricted only to neighboring states with respect to tax shares. Whether competition exists regionally, commercially, or on an industrial basis remains speculative. If all states attempt to minimize the

net residential costs associated with raising required revenues, what are the implications for individual states and for the United States as a whole? Further pursuit of these questions involves a general equilibrium framework across states.

Lastly, the data set can be expanded to include both state and local fiscal behavior across time. With the addition of local government choices, the degree of substitutibility between state and local taxes as alternative revenue sources can be estimated. Specifically, the relationship between local property taxes and alternative state tax sources can be measured and the implications can be drawn in connection with current federal tax reform.

And by expanding the data set across time, I can investigate earlier policy changes. For example, does past elimination of certain federal deductibility provisions help to explain the evolution of state tax structures across time? How dramatic was the increase in severance tax reliance for the dominant oil producing states in the energy-induced inflationary 1970s?

Admittedly, this dissertation only begins to explore the economics of state and local revenue choice. There is room for a lot more work to be done in this area. It is only recently that economists have become involved with studies in this direction. The research reported in this thesis should generate continued interest in studying

optimal state tax design.

APPENDIX

APPENDIX A

TABLE XVI

REMAINING DATA USED

STATE	TN	FN	TEMP	BPF
ALABAMA	$564.3	$134.8	67.5°	.970
ALASKA	$6348.0	$290.2	40.0°	.767
ARIZONA	$682.9	$96.6	71.2°	.856
ARKANSAS	$553.1	$73.4	61.9°	.946
CALIFORNIA	$920.7	$87.3	62.6°	.841
COLORADO	$584.8	$139.2	50.3°	.900
CONNECTICUT	$753.0	$93.2	49.8°	.792
DELAWARE	$998.0	$224.8	54.0°	.813
FLORIDA	$570.5	$37.2	75.6°	.852
GEORGIA	$600.5	$58.8	61.2°	.923
HAWAII	$1104.9	$212.4	77.0°	.690
IDAHO	$612.3	$66.0	51.1°	.909
ILLINOIS	$650.6	$58.0	49.2°	.832
INDIANA	$557.9	$123.2	52.1°	.934
IOWA	$685.3	$142.1	49.7°	.959
KANSAS	$610.6	$110.3	56.4°	.875
KENTUCKY	$680.4	$101.5	56.2°	.862
LOUISIANA	$744.0	$90.3	68.2°	.939
MAINE	$649.8	$100.8	45.0°	.864
MARYLAND	$757.4	$128.1	55.1°	.887
MASSACHUSETTS	$837.3	$91.9	51.5°	.838
MICHIGAN	$681.2	$116.1	48.6°	.951
MINNESOTA	$931.9	$125.2	44.7°	.923
MISSISSIPPI	$580.3	$111.2	64.6°	.955
MISSOURI	$470.4	$67.3	54.1°	.904

TABLE XVI (cont.)

STATES	TN	FN	TEMP	BPF
MONTANA	$672.4	$91.7	44.7°	.855
NEBRASKA	$548.1	$116.6	51.1°	.925
NEVADA	$933.0	$55.2	49.4°	.850
NEW HAMPSHIRE	$353.4	$120.7	45.3°	.860
NEW JERSEY	$757.4	$103.8	53.1°	.709
NEW MEXICO	$945.2	$118.3	56.2°	.925
NEW YORK	$879.3	$55.8	54.5°	.744
NORTH CAROLINA	$645.2	$95.8	60.0°	.953
NORTH DAKOTA	$814.4	$342.3	41.3°	.469
OHIO	$539.0	$108.1	54.5°	.927
OKLAHOMA	$896.5	$141.1	59.9°	.867
OREGON	$589.8	$125.4	53.0°	.855
PENNSYLVANIA	$689.8	$67.1	54.3°	.871
RHODE ISLAND	$711.8	$169.0	50.3°	.949
SOUTH CAROLINA	$628.2	$105.6	63.3°	.969
SOUTH DAKOTA	$476.5	$137.2	45.3°	.733
TENNESSEE	$467.5	$76.1	61.8°	.939
TEXAS	$639.6	$70.2	66.0°	.903
UTAH	$650.8	$148.9	51.7°	.898
VERMONT	$649.0	$168.3	44.1°	.951
VIRGINIA	$605.3	$146.0	59.5°	.927
WASHINGTON	$854.3	$89.2	51.4°	.848
WEST VIRGINIA	$753.3	$97.5	54.8°	.902
WISCONSIN	$836.1	$118.5	46.1°	.950
WYOMING	$1619.0	$80.4	45.7°	.934

TABLE XVI (cont.)

STATES	MEDINC	MEDZ	COMPY	COMPGS
ALABAMA	$13669	$857.8	.124	.470
ALASKA	$25414	$2792.7	0	0
ARIZONA	$16448	$532.3	.205	.413
ARKANSAS	$12214	$847.0	.128	.378
CALIFORNIA	$18243	$998.2	.287	.312
COLORADO	$18056	$780.5	.202	.345
CONNECTICUT	$20077	$770.4	.389	.235
DELAWARE	$17846	$1047.4	.300	.256
FLORIDA	$14675	$500.4	.289	.309
GEORGIA	$15033	$828.9	.190	.369
HAWAII	$20473	$1292.6	0	0
IDAHO	$15285	$828.2	.207	.291
ILLINOIS	$19321	$718.0	.320	.327
INDIANA	$17582	$585.5	.273	.298
IOWA	$16799	$700.4	.288	.338
KANSAS	$16362	$663.7	.288	.310
KENTUCKY	$13965	$862.8	.252	.392
LOUISIANA	$15227	$844.2	.132	.413
MAINE	$13816	$1010.0	.046	0
MARYLAND	$20281	$866.7	.345	.253
MASSACHUSETTS	$17575	$919.9	.256	.216
MICHIGAN	$19223	$911.1	.229	.403
MINNESOTA	$17761	$954.9	.213	.331
MISSISSIPPI	$12096	$1042.6	.147	.359
MISSOURI	$15581	$626.5	.252	.318

TABLE XVI (cont.)

STATES	MEDINC	MEDZ	COMPY	COMPGS
MONTANA	$15420	$1009.6	.111	.343
NEBRASKA	$15925	$671.1	.222	.359
NEVADA	$18211	$742.1	.386	.289
NEW HAMPSHIRE	$17013	$716.6	.370	.226
NEW JERSEY	$19800	$797.8	.415	.160
NEW MEXICO	$14654	$1031.6	.229	.353
NEW YORK	$16647	$1154.1	.271	.257
NORTH CAROLINA	$14481	$701.3	.289	.347
NORTH DAKOTA	$15293	$1107.1	.227	.258
OHIO	$17754	$629.7	.255	.373
OKLAHOMA	$14750	$682.4	.211	.367
OREGON	$16780	$904.9	.180	.412
PENNSYLVANIA	$16880	$773.5	.347	.258
RHODE ISLAND	$16097	$1142.2	.270	.310
SOUTH CAROLINA	$14711	$783.1	.371	.269
SOUTH DAKOTA	$13156	$1003.4	.228	.234
TENNESSEE	$14142	$760.1	.297	.316
TEXAS	$16708	$561.5	.150	.310
UTAH	$17671	$1230.0	.159	.381
VERMONT	$14790	$1421.4	.350	.133
VIRGINIA	$17475	$700.6	.255	.357
WASHINGTON	$18367	$820.0	.502	.126
WEST VIRGINIA	$14564	$984.6	.314	.263
WISCONSIN	$17680	$919.3	.356	.269
WYOMING	$19994	$1982.9	.264	.317

TABLE XVII

DESCRIPTIVE STATISTICS FOR THE VARIABLES USED

VARIABLE	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
TXSHY	.24828	.1619	0	.624
TXSHGS	.30798	.1482	0	.543
TXSHSS	.1921	.0765	.026	.469
TN	$825.7	$821.7	$353.4	$6348
FN	$116.6	$55.9	$37.2	$342.3
VANM	.03426	.0733	0	.384
VANM1	.88142	.0451	.7695	.9814
VAM	.12614	.2853	0	.984
VAM1	.13748	.3378	0	1.98
BPY	.79444	.1301	.515	.993
BPGS	.94762	.0259	.884	.998
TEMP	54.7°F	8.49°F	40°F	77°F
BPF	.8739	.0897	.469	.970
MEDINC	$16640	$2443	$12096	$25414
MEDZ	$920.3	$369.5	$500.4	$2793
COMPY	.24782	.1010	0	.502
COMPGS	.29246	.1026	0	.470

BIBLIOGRAPHY

BIBLIOGRAPHY

Advisory Commission on Intergovernmental Relations (1982a), Tax Capacity of the Fifty States: Methodology and Estimates, Washington, D. C., March.

------ (1982b), Significant Features of Fiscal Federalism, 1981-1982 Edition, Washington, D. C.

------ (1984), Significant Features of Fiscal Federalism, 1984 Edition, Washington, D. C.

All States Tax Handbook, (1982), Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

Bahl, R. (1984), Financing State and Local Government in the 1980s, Oxford University Press, Inc., New York.

Barr, J. and O. Davis (1968), "An Elementary Political and Economic Theory of the Expenditures of Local Governments," Southern Economic Journal, 149-165.

Bergstrom, T. and R. Goodman (1973), "Private Demands for Public Goods," American Economic Review, 280-296.

Borcherding, T. and R. Deacon (1972), "The Demand for the Services of Non-Federal Governments," American Economic Review, 842-853.

Bradbury, K. L. and H. F. Ladd (1984), "Changes in the Fiscal Capacity of U. S. Cities 1970-1982," in Proceedings of the Seventy-Seventh Annual Conference on Taxation, National Tax Association - Tax Institute of America, 205-217.

Breeden, C. H. and W. J. Hunter (1985), "Tax Revenue and Tax Structure," Public Finance Quarterly, 216-224.

Brennan, G. and J. Buchanan (1982), The Power to Tax, Cambridge University Press, Cambridge.

Bridges, B., Jr. (1966), "Deductibility of State and Local Non-Business Taxes Under the Federal Individual Income Tax," National Tax Journal, 1-17.

Browning, E. K. (1976), "The Marginal Cost of Public Funds," Journal of Political Economy, 283-298.

Buchanan, J. M. and M. V. Pauly (1970), "On the Incidence of Tax Deductibility," National Tax Journal, 157-167.

Bureau of the Census (1981), Census of Manufactures: 1977, Washington, D. C., U. S. Government Printing Office.

------ (1982), Census of Population: 1980. Characteristics of the Population. Number of Inhabitants, Washington, D. C., U. S. Government Printing Office.

------ (1983a), Census of Population: 1980. Characteristics of the Population. General Social and Economic Characteristics, Washington, D. C., U. S. Government Printing Office.

------ (1983b), Government Finances. State Government Finances in 1982, Washington, D. C., U. S. Government Printing Office.

------ (1983c), Government Finances. State Government Tax Collections in 1982, Washington D. C., U. S. Government Printing Office.

------ (1983d), Statistical Abstract of the United States 1984, Washington, D. C., U. S. Government Printing Office.

------ (1984a), Census of Population: 1980. Journey to Work: Characteristics of Workers in Metropolitan Areas, Washington, D. C., U. S. Government Printing Office.

------ (1984b), Governmental Finances. Compendium of Government Finances. 1982 Census of Governments, Washington, D. C., U. S. Government Printing Office.

------ (1984c), Federal Expenditures by State for Fiscal Year 1983, Washington, D. C., U. S. Government Printing Office.

------ (1984d), Government Finances. State Government Finances in 1983, Washington, D. C., U. S. Government Printing Office.

------ (1985a), Census of Manufactures: 1982, Washington, D. C., U. S. Government Printing Office.

------ (1985b), Census of Mineral Industries: 1982, Washington, D. C., U. S. Government Printing Office.

Chiang, A. C. (1984), Fundamental Methods of Mathematical Economics, Third Edition, McGraw-Hill Book Company, New York.

Church, A. M. (1978), "Conflicting Federal, State and Local Interest Trends in State and Local Energy Taxation: Coal and Copper - A Case in Point," National Tax Journal, 269-283.

Craig, S. G. and R. P. Inman (1984), "Education, Welfare, and the 'New' Federalism: State Budgeting in a Federalist Public Economy," Working Paper.

Deacon, R. T. (1977), "Private Choice and Collective Outcomes: Evidence from Private Sector Demand Analysis," National Tax Journal, 371-386.

Federation of Tax Administrators (1982), Trends in State Tax Legislation, 1980-1981, Research Report Number 92, March.

Feenberg, D. R. and H. S. Rosen (1985), "State Personal Income and Sales Taxes: 1977-1983," National Bureau of Economic Research, Working Paper Number 1631, June.

Feldstein, M. S. (1973), "On the Optimal Progressivity of the Income Tax," Journal of Public Economics, 357-376.

------ (1985), "A Tax Reform Mirage," The Wall Street Journal, editorial page, November 20.

Feldstein, M. S. and G. Metcalf (1986), "The Effect of Federal Tax Deductibility on State and Local Taxes and Spending," National Bureau of Economic Research, Working Paper Number 1791, January.

Fisher, R. C. (1977), "The Combined State and Federal Income Tax Treatment of Charitable Contributions," in Proceedings of the Seventieth Annual Conference on Taxation, National Tax Association - Tax Institute of America, 397-404.

------ (1978), "Comments on 'Does Federalism Matter? Political Choice in a Federal Republic'," Presented at the Workshop in Analytical Urban Economics, Queen's University, June.

------ (1985), "Tax Expenditures in the U. S.: Public Opinion Surveys and Incidence Analysis Compared," Economic Inquiry, 525-550.

Flowers, M. R. (1977), "Multiple Tax Sources, Voting Equilibrium, and Budgetary Size," Public Finance, 210-224.

------ (1981), "Majority Voting on Tax Shares: A Simple Life-Cycle Model," Public Finance Quarterly, 47-59.

Gerking, S. D. and J. H. Mutti (1981), "Possibilities for the Exportation of Production Taxes," Journal of Public Economics, 233-252.

Gillis, M. and C. E. McLure, Jr. (1975), "Incidence of World Taxes on Natural Resources with Special Reference to Bauxite," American Economic Review, 389-396.

Gillis, M. (1979), "Severance Taxes on Energy Resources in the United States," Growth and Change, 55-71.

Gold, S. D. (1983), "Recent Developments in State Finances," National Tax Journal, 1-29.

Gramlich, E. M. and D. L. Rubinfeld (1982), "Micro Estimates of Public Spending Demand Functions and Tests of the Tiebout and Median Voter Hypothesis," Journal of Political Economy, 536-560.

Gramlich, E. M. (1985), "The Deductibility of State and Local Taxes," National Tax Journal, 447-465.

Hettich, W. and S. Winer (1984), "A Positive Model of Tax Structure," Journal of Public Economics, 67-87.

Hewett, R. S. and S. C. Stephenson (1983), "State Tax Revenues Under Competition," National Tax Journal, 95-101.

Hogan, T. and R. Shelton (1973), "Interstate Tax Exportation and a State's Fiscal Structure," National Tax Journal, 553-564.

Inman, R. P. (1971), "Towards an Econometric Model of Local Budgeting," in Proceedings of the Sixty-Fourth Annual Conference on Taxation, National Tax Association - Tax Institute of America, 699-719.

------ (1978), "Testing Political Economy's 'As If' Proposition: Is the Median Income Voter Really Decisive," Public Choice, 45-65.

------ (1979a), "The Fiscal Performance of Local Governments: An Interpretive Review," in Current Issues in Urban Economics, edited by P. Mieszkowski and M. Straszheim, John Hopkins University Press, Baltimore.

------ (1979b), "Subsidies, Regulations, and the Taxation of Property in Large U. S. Cities," National Tax Journal, 159-168.

------ (1985), "Does Deductibility Influence Local Taxation," Working Paper Number 85-6, Federal Reserve Bank of Philadelphia, May.

Internal Revenue Service (1982), Statistics of Income: Individual Income Tax Returns 1979, Washington, D. C., U. S. Government Printing Office.

------ (1984), Statistics of Income: Individual Income Tax Returns 1982, Washington, D. C., U. S. Department of Treasury, Office of Tax Analysis.

Kahn, C. H. (1960), Personal Deductions in the Federal Income Tax, Princeton University Press, Princeton, New Jersey.

Kenyon, D. A. (1984), "Federal Income Tax Deductibility of State and Local Taxes: What Are Its Effects? Should It Be Modified?," in Advisory Commission on Intergovernmental Relations, Strengthening the Federal Revenue System: Implications for State and Local Taxing and Borrowing, October.

------ (1985a), "Federal Income Tax Deductibility of State and Local Taxes," Discussion Draft, June.

------ (1985b), "Federal Deductibility of State-Local Taxes: Unresolved Issues," Presented at the American Economic Association Meetings, December 29.

Kolstad, C. D. and F. A. Wolak, Jr. (1983), "Competition in Interregional Taxation: The Case of Western Coal," Journal of Political Economy, 443-460.

Ladd, H. F. (1975), "Local Education Expenditures, Fiscal Capacity, and the Composition of the Property Tax Base," National Tax Journal, 145-158.

------ (1984), "Aid to State and Local Governments," in Federal Budget Policy in the 1980s, edited by G. Mills and J. Palmer, The Urban Institute, Washington, D. C.

Leser, C. E. V. (1963), "Forms of Engel Functions," Econometrica, 694-703.

Lewis, D. E. (1978), "Regional Trade Flows of Manufactured Products," in The Annuals of Regional Science, 62-73.

Lindsay, C. M. (1972), "Two Theories of Tax Deductibility," National Tax Journal, 43-52.

Maxwell, J. A. (1962), Tax Credits and Intergovernmental Fiscal Relations, Brookings Institution, Washington, D. C.

McCaleb, T. S. (1981), "Excess Burden and Optimal Income Taxation," Public Finance, 393-410.

McLure, C. E., Jr. (1967), "The Interstate Exporting of State and Local Taxes: Estimates for 1962," National Tax Journal, 49-75.

------ (1978), "Economic Constraints on State and Local Taxation of Energy Resources," National Tax Journal, 257-262.

------ (1979), "Severance Taxes on Energy Resources in the United States: Comment," Growth and Change, 72-74.

------ (1981), "Market Dominance and the Exporting of State Taxes," National Tax Journal, 483-485.

Miller, E. W. (1970), A Geography of Industrial Location, WM. C. Brown Company Publishers, Dubuque, Iowa.

Mirrlees, J. A. (1971), "An Exploration in the Theory of Optimum Income Taxation," Review of Economic Studies, 175-208.

Morgan, W. E. and J. H. Mutti (1981), "Shifting, Incidence and Inter-State Exportation of Production Taxes on Energy Resources," Land Economics, 422-435.

------ (1983), "The Exportation of State and Local Taxes in a Multilateral Framework: The Case of Household Type Taxes," National Tax Journal, 459-475.

------ (1985), "The Exportation of State and Local Taxes in a Multilateral Framework: The Case of Business Type Taxes," National Tax Journal, 191-208.

Moscovitch, E. (1972), "State Graduated Income Taxes - A State-Initiated Form of Federal Revenue Sharing," National Tax Journal, 53-64.

Noto, N. A. and D. Zimmerman (1983), "Limiting State-Local Tax Deductibility in Exchange for Increased General Revenue Sharing: An Analysis of the Economic Effects," Prepared for the U. S. Senate Subcommittee on Intergovernmental Relations, August.

------ (1984), "Limiting State-Local Tax Deductibility: Effects Among the States," National Tax Journal, 539-550.

Okner, B. A. (1966), Income Distribution and the Federal Income Tax, Institute of Public Administration, University of Michigan, Ann Arbor, Michigan.

Phares, D. (1980), Who Pays State and Local Taxes, Oelgeschlager, Gunn and Hain, Publishers, Inc., Cambridge, Massachusetts.

Pindyck, R. S. and D. L. Rubinfeld (1981), Econometric Models and Economic Forecasts, Second Edition, McGraw-Hill Book Company, New York.

Rock, S. M. (1984), "The Impact of Deductibility on the Incidence of a General Sales Tax," National Tax Journal, 105-112.

Rosen, H. S. (1985), Public Finance, Richard D. Irwin, Inc., Illinois.

Sadka, E. (1976), "On Income Distribution, Incentive Effects and Optimal Income Taxation," Review of Economic Studies, 261-268.

Sandmo, A. (1976), "Optimal Taxation - An Introduction to the Literature," Journal of Public Economics, 37-54.

Seade, J. K. (1977), "On the Shape of Optimal Tax Schedules," Journal of Public Economics, 203-236.

Sjoquist, D. L. (1981), "A Median Voter Analysis of Variations in the Use of Property Taxes Among Local Governments," Public Choice, 273-285.

Stern, N. H. (1976), "On the Specification of Models of Optimum Income Taxation," Journal of Public Economics, 123-162.

Strauss, R. P. (1984), "Business Taxes in West Virginia," Final Report of the West Virginia Tax Commission, March.

Tax Foundation, Inc. (1982), Tax Review: State Tax Action in 1982, Washington, D. C.

------ (1983), Facts and Figures on Government Finance, 22nd Biennial Edition, Washington, D. C.

Tax Review Commission, State of Hawaii (1984), Report of the First Tax Review Commission to the Thirteenth Legislature, Honolulu, Hawaii.

Thomassen, H. (1985), "Tax Reform: The View from the States," National Tax Journal, 295-304.

Varian, H. R. (1978), Microeconomic Analysis, W. W. Norton and Company, Inc., New York.

Wagner, R. E. (1976), "Revenue Structure, Fiscal Illusion, and Budgetary Choice," Public Choice, 45-61.

Wheaton, W. (1983), "Interstate Differences in the Level of Business Taxation," National Tax Journal, 83-94.

Yitzhaki, S. (1979), "A Note on Optimal Taxation and Administrative Costs," American Economic Review, 475-480.

Zimmerman, D. (1983), "Resource Misallocation from Interstate Tax Exportation: Estimates of Excess Spending and Welfare Loss in a Median Voter Framework," National Tax Journal, 183-201.

------ (1985a), "Treatment of State-Local Taxes and Tax-Exempt Bonds Under Tax Reform Proposals: Effects on the State-Local Sector," Congressional Research Service, The Library of Congress, Washington, D. C., January.

------ (1985b), "Tax Reform and Federal Subsidy of the State-Local Sector: Is There a Role for State-Local Tax Deductibility?," Congressional Research Service, The Library of Congress, Washington, D. C., January.