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Fiscal Policy and Local Economic Development

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Fiscal Policy and Local Economic Development

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Executive Summary

The purpose of this study is to inform on the current state of knowledge of the economics profession of the impacts of state and local taxes on economic activity such as employment and property values. Our goal is also to suggest how to interpret some of the findings of this literature as well as to provide some conceptual background to assist in interpreting these findings.

I. Introduction

Section I provides a brief introduction to the material along with an outline for the study.

II. Three Simple (and Mostly True) Rules for Tax Analysis

Section II discusses some basic rules for tax analysis. Economic theory suggests that the actual burden of a tax, that is, what a party actually "pays" for a tax, the incidence of that tax, is unrelated to whom the tax is statutorily assigned. Thus taxes collected from employers might be passed forward to employees while taxes on residents (employees) might be passed back to employers in terms of higher wages and compensation.
  - o For the reason, studies that examine the impact of taxes on business location also include what are considered non-business taxes (sales and income taxes) as well as business taxes (property and corporate income).
  - o Instead, the incidence tax depends on the relative elasticity of the demand and supply, that is, how the quantities of demand and supply for a product respond to changes in the price of the product. If demand is relatively more responsive (elastic) than supply, the incidence of the tax is on suppliers (firms, or in the case of the labor market, employees); if supply is more responsive, the incidence is on demand (consumers, or in labor markets, firms).
  - o The impact of taxes on the level of output or business activity will depend on the *combined* elasticities of demand and supply. Thus, unresponsiveness of employment to changes in taxes could be due to either unresponsive (inelastic) demand (firms) or inelastic supply (employees/residents).

III. The Implications of *Inter*jurisdictional Mobility on Tax Incidence and Impacts

Critical to understanding and interpreting the impacts of taxes on both business location and property values is the *Tiebout* hypothesis. Section III discusses the *Tiebout* hypothesis. Tiebout contended that:
  - o Households (and firms) are mobile among jurisdictions, be they states or localities, and will choose where to locate among these jurisdictions based on

the taxes and public services provided by the jurisdiction, as well as non-government provided amenities.
- o Sorting of households and firms among jurisdictions can lead to both an efficient sorting based on preferences for services and taxes, as well as an efficient provision of public services by jurisdictional governments.

IV. Fiscal Policy and Economic Development

Section IV provides a discussion of fiscal policy and economic development. While no consensus has emerged on the impact of taxes on business location, there is growing evidence that state and local taxes do play a role in the location of businesses, regional employment, and gross state product.

The general measure of the impact of taxes on economic activity is the *tax elasticity* which is defined to be the percentage change in the level of economic activity (employment, for example) divided by the percentage change in the tax rate. Thus a tax elasticity of -.5 means a 10% increase in the tax rate reduces economic activity by 5%; an elasticity of -1.5 means a 20% decrease in the tax rate would increase economic activity by 30%.

The impact of taxes on business location depends on whether *inter-state* business location decisions are examined with a focus on the differences in taxes among states or *intra-state* or *intra-metropolitan* decisions are examined with a focus on differences in local taxes among cities or counties within a state.

- o Based on the most plausible estimates, a reasonable range of the tax elasticity for inter-state business location ranges from -.25 to -.5, meaning that a 10% reduction in taxes would increase employment by 2.5% to 5%.
- o Business activity within a state or metropolitan area, including employment, is significantly more responsive to changes in local taxes than it is across states and with respect to differences in state taxes. Again, based on the most plausible estimates, the tax elasticity for intra-state business location is from -1.5 to -2, meaning that a 10% reduction in local property taxes would increase employment from 15 to 20%.
- o The evidence of the impact of targeted incentive programs such as enterprise or empowerment zones on employment in depressed areas is at best mixed, with little strong evidence of any significant increases in employment arising from these programs.
- o In contrast to enterprise zones, a few recent studies suggest that the location of major manufacturing plants as a result of "bidding" may have significant long-term positive impacts on employment as well as on wages and property values.
- o Reliable estimation of tax elasticities requires some accounting of the impact of public services on economic activity as well. While the evidence is weaker than it is on taxes, numerous studies find a significant and positive impact of

public services, particularly highways, on business location and economic activity.

V.   State and Local Fiscal Policies and Property Value

Section IV discusses state and local fiscal policies as they relate to property value. Numerous empirical studies examining the determinants of property values indicate that increases in property tax rates, when controlling for the level of public service, will reduce residential property values.

- Evidence of the negative relationship between property values and tax rates suggests that households are influenced by property tax rates when making decisions about where to reside. This is one of the central tenets of the Tiebout Hypothesis.
    - The magnitude of the reduction is referred to as the capitalization rate, a 100% capitalization rate would mean that a 10% increase in the property tax rate would reduce property values by 10%; a 50% capitalization rate means a reduction of 5% in property values for the same tax increase.
    - Studies of the capitalization of property taxes are distinguished by studies examining *inter-jurisdictional* differences in taxes and property tax rates and studies considering *intra-jurisdictional* differences generally due to differences between assessed and market value. The evidence from the most reliable estimates using data on individual properties and market values suggests capitalization rates between 60% and 90%.

- In addition to taxes affecting property values, public services, particularly primary and secondary education, affect property values.
    - Studies of the impact of education on property values suggest that not only does educational spending positively affect property values, but so do measures of achievement (test scores or graduation rate) as well as inputs in production (student/teacher) ratio for the school or district.
    - Economic theory suggests that the efficient level of public services is the level that provides the highest property value when both the positive impact of educational spending and the negative impact of the taxes used to finance it are considered. Numerous studies indicate that the claim that educational spending is at an efficient level, that is, the level that maximizes property values can not be rejected.

VI.   The Global Impacts of Taxation

As discussed in Section VI, numerous articles in the past twenty years have argued and presented theoretical models that suggest that state or local governments when setting taxes and public services for their residents may not be setting the "globally" desirable or efficient level of taxes.

- When state or local governments increase their rate of taxation on mobile business capital, some of that business capital will leave the jurisdiction. While a loss to that jurisdiction, this is a benefit to the jurisdiction receiving the capital. This is referred to as a "fiscal externality".
  - Most studies argue that this competition for mobile capital results in state and local governments engaged in a race to the bottom and setting inefficiently low tax rates.
  - In contrast, if the governments use taxes to finance public services or inputs for firms, there is a tendency to overprovide public services.
  - There is no empirical evidence on how costly this tax competition is. However, simple numerical modeling indicates that while competition may lead to significantly lower tax rates and public services the welfare cost, the loss in real income, is quite small.

VII. *Taxes, Economic Activity, and Property Values: How and Why does it Matter?*

Section VII provides a brief summary and conclusion.

- While the impact of taxes on employment and firm location is clearly a matter of significant importance to politicians and policy-makers, economists have questioned its relevance as changes in employment or any other output are not a direct measure of the impact of a policy on economic well-being.
- While not a direct measure of economic well-being, examining the impacts of balanced-budget changes in tax policies (both tax and public services) on employment might offer some insights into the desirability of the current level of taxes (and public services) as well as the current mix of taxes.

I.   Introduction

I.A   The Focus of the Study

It is the purpose of this study to review and evaluate an extensive literature within the field of economics that examines the impacts of state and local fiscal policies, particularly those labeled "economic development" policies. Within this extensive and diverse literature on state and local fiscal policies, we identify and discuss three distinct strands of the literature:

- A literature that focuses on the impacts of state and local fiscal policies, primarily but not exclusively taxes, on economic development, usually measured in terms of employment.

- A literature that focuses on how fiscal policies, in this case primarily, though not exclusively, property taxation, affect housing markets, or, more specifically, property values.

- A literature that considers the "global" impacts of local and state tax and expenditure policies – how the policies chosen by one state or locality will affect economic conditions and fiscal policies of its neighboring or "competing" jurisdictions.

The purpose of this study is not to provide an exhaustive discussion of the multitude of studies on these topics but instead to attempt the more challenging task of evaluating which studies are most relevant and discerning conclusions and inferences from often contradictory studies in a literature economists have been contributing to for over forty years. Our primary interest is what the findings of these studies suggest

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regarding the impacts of state and local fiscal policies on economic development and more specifically on real estate markets.

I.A.1 Fiscal Policy and Economic Development

State and local governments have a plethora of policies designed to stimulate economic activity and development with employment generally the primary focus. Given the interest of state and local governments, as well as other interest groups, on the impacts of fiscal policies, usually in the form of taxation or locational incentives, on economic development and employment, it is not surprising that an extensive literature examining the impacts of these state and local development policies has developed in the past forty years and continues to grow.

What may be surprising and perhaps disturbing for those hoping to use the findings of this literature to evaluate the efficacy of alternative state and local fiscal and economic development policies is what might appear to be the lack of consensus of the findings of these studies. Given the length of time this issue has been studied (the initial study of the impact of fiscal policies on employment is generally attributed to John F. Due in 1964) and how the methodology, the nature of the data, and even the findings have changed during the past forty years, the diversity and range of findings is perhaps not as surprising as it at first might seem. It is our feeling that the findings of these studies must be evaluated in the context of the quality of both the data and the methodology used in the study as well as the time and geography examined in the study. Here, based upon our review of this extensive literature and our evaluation of the quality and relevance of the studies, we focus on what conclusions might be drawn

from what we believe are the studies with the soundest methodology and data and have the most relevance for current state and local fiscal policies. While we are not entirely dismissive of the finding of early studies of state and local taxation, by focusing on the studies with the soundest methodology, highest quality data and most relevance for current policy we can narrow our discussion generally to studies of the past twenty years.

As we discuss in more detail in *Section II* of this report, the underlying theory of tax analysis suggests that it is, in fact, probably not appropriate for studies examining the impact of fiscal policies to focus narrowly on taxes related directly to employment or "business" taxes collected from firms. Nor is it appropriate to consider only the impact of taxes and ignore the impact of government expenditures on economic activity, a flaw of many of the early studies of fiscal policies and economic development.

Many of the studies we have reviewed focus on fiscal policies specifically designed to encourage local economic development, that is, policies intended to reduce firms' costs and attract them to or retain them at a location. These generally may be thought of as business taxes or subsidies that may be broad based, when all firms or potential arrivals to the location qualify, or they may be targeted to a subset of firms. Common examples of the former are reductions in the state corporate income tax, sales tax or property tax. The latter tend to be more varied. Examples include subsidized credit (through tax exempt borrowing, government-guaranteed credit or state-supported venture capital funds), state operated training programs for firms, job

subsidies, enterprise zones and a variety of tax exemptions, credits, abatements and special treatments.

While many of these studies focus narrowly on a specific tax or development policy many others that we review and discuss reflect the idea that a broad array of taxes and fiscal policies need to be considered to fully understand how economic development is affected by state and local policies. Thus, for example, many studies, particularly earlier ones, make no distinction between taxes paid by firms and those paid by households, aggregating taxes to simply determine an "effective" total tax rate, usually per capita or as a percentage of income.

While some studies attempt to determine how tax policies might affect economic development by determining how changes in tax policies or incentive policies might alter firms' costs, the vast majority of studies and the focus of our review is on studies that attempt to directly determine how these policies affect state or local economic conditions and do not attempt the more micro-based effort of determining how much taxes affect firm costs. Typically, studies focus on the effects on employment, wages, the size of the manufacturing sector, the poverty rate, housing prices and local economic growth.

I.A.2   Taxes and Property Value

Since a seminal study by Wallace Oates published in the <u>Journal of Political Economy</u> in 1969, a multitude of studies have examined the relationship between primarily local, rather than state, fiscal policies and property values. Not surprisingly, the fiscal policy of most interest has generally been the property tax. However,

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numerous other studies have focused on the impacts of government expenditures rather than taxes on property values. The majority of these studies have considered how primary and secondary educational expenditures or quality of education, by a variety of measures, have affected property values. Other studies, fewer in number, consider how government policies or services, such as police and safety or parks and recreation, affect property values.

Here again, we attempt to offer some insights into what this voluminous and diverse literature offers in regard to the impact of local government taxes and policies on property values. In addition to discussing the results of studies that offer evidence of the impact of local policies from the analysis of data on property values and local policies, we also discuss in a very general and non-technical way some of the more theoretical literature that provides a motivation for the extensive empirical research on this topic. Specifically, we discuss and explain how evidence on taxes and other local government policies affect property values and can be interpreted as evidence that: 1) households (and firms) are mobile among local governments and their location decisions are influenced by government policies; and 2) that local government tax/service policies are or are not efficiently provided.

I.A.3   *The Global Impacts of State and Local Fiscal Policies*

Most of the literature that we review on the impact of fiscal policy on economic development might generally be viewed as "positive" analysis focused on finding evidence on the impacts of fiscal policies on economic development rather than "normative" analysis evaluating the efficacy or desirability of these policies. However,

these "positive" studies are probably motivated by the underlying view that local fiscal policies that reduce employment or other measured economic activity within the locality are undesirable.

However, the implications of more recent literature, dating to the mid 1980's, argue that the focus of studies on the effect of state and local fiscal policies on economic activity only within the jurisdiction enacting the policy may offer misleading conclusions about what state and local fiscal policies are socially desirable from a more "global" viewpoint. That is, are these policies still desirable when the economic conditions of neighboring states and localities are also considered.

This literature argues that, from a policy point of view, it is important to know the effects of policies not just in a particular locality, but also in surrounding areas. For example, policies in one municipality in a metropolitan area can have effects on the re-maining metropolitan area that might offset those in the municipality itself. Similarly, the effects of policies in one state could have offsetting effects for other states in the region or for the nation as a whole. For example, employment increases in the location with the incentive might reduce employment elsewhere. Thus, while reductions in tax rates in one state may increase the tax base and economic activity within that state and increase the welfare of that state's residents, these tax reductions, by inducing firms to leave neighboring states might reduce the tax base and economic activity in these states, reducing resident well-being in the neighboring states. Thus, what might appear to be a beneficial fiscal policy, based on the examination of the impacts of the policy on the

economy of state enacting it, may not be globally beneficial when the impacts on neighboring states are considered.

The effect local policies have outside the location are sometimes referred to as "spillovers" -- an issue generally ignored by the studies on fiscal policies and economic development described earlier. The literature that examines the impacts of these spillovers, or what is sometimes referred to as "fiscal externalities," is sometimes referred to as the literature on "tax competition" or more recently "fiscal competition" reflecting increased interest by researchers in this field on the spillovers generated by expenditure as well as tax policies. In stark contrast to the literatures on fiscal policy and economic development, as well as fiscal policies and property values, the literature on tax competition is primarily theoretical with only limited empirical studies. The empirical studies that do exist, and which we discuss later, have focused on evidence of whether and how fiscal policies in one state or locality influence policies chosen in other states or localities.

I.B   Background and Underlying Economic Theory

Before our discussion of these three branches of literature on state and local fiscal policies, we provide a very brief and non-technical summary of the salient aspects of the general methodology or "rules" of tax analysis as generally done by economists. In order to better understand the methodology used in the studies we review on state and local fiscal policy, a simple overview of the basic principles of tax analysis is desirable.

In addition to a discussion of some of the general rules of tax analysis, we also discuss the "Tiebout" hypothesis (Tiebout (1956), a theory of state and local govern-

ments that is central to both the understanding of some of the methodology employed in these studies as well as the implications of some of their findings.

I.C   *State and Local Tax Policies in Practice*

While the focus of this report is on the findings of previous studies examining the impacts of state and local fiscal policies on economic development rather than providing new evidence on this topic, in order to give some context of the potential importance and implications of these studies some summary measures and descriptions of both current and past tax state and local tax practices are included.

I.D   *Outline of the Report*

We begin in *Section II* by providing a brief description of and rational for tax analysis as generally used by economists. This is followed in *Section III* by a discussion of the Tiebout hypothesis and the context it offers for studies on state and local fiscal policies.

The next three sections are devoted to the primary purpose of this report, a review and interpretation of these three branches of the literature on state and local fiscal policies found within the economics literature.

II.   **Three Simple (and Mostly True) Rules for Tax Analysis**

Without question, the methodology used, as well as the questions addressed in economic studies of state and local tax policies, are influenced by the training of economists, particularly with respect to tax analysis. How researchers in other fields, for example, political science or law, might evaluate state and local tax policy and what questions they address are likely to be very different than those posed by economists.

Both the methodology used by economists to find evidence of the impact of state and local fiscal policies, as well as what impacts they might expect to find, are profoundly influenced by underlying assumptions and models of taxes that might be found in any intermediate level text on public finance. Here we consider four "rules" underlying tax analysis as performed by economists:

1. Only people pay taxes;

2. The economic incidence of a tax is independent of its statutory incidence;

3. Taxes and Efficiency: The Impact of Taxes on Quantity: (The inefficiency associated with taxes is directly related to how much the tax distorts consumption from the level of consumption in the absence of taxation);

II.A   Only People Pay Taxes

While this rule may seem obvious, its implications for determining who actually pays the taxes seem to be frequently ignored in policy discussions. This rule is most relevant when analyzing the impacts of "business" taxes. Businesses, regardless of their organizational and legal structure, do not, themselves, bear the burden of taxes. While a corporation may statutorily be responsible for paying the corporate income tax, the burden of this tax must fall on some person or group of persons, including the owners (shareholders) of the corporation, employees of the corporation as well as consumers of the goods produced by the corporation. Thus "business" taxes should not inherently be viewed as distinct from taxes directly assessed on households or consumers, both are taxes on "people" and, as we discuss next, not necessarily on different groups of people.

II.B   Economic Incidence is Independent of Statutory Incidence

Businesses do not pay, in the sense economists mean, taxes. Instead, as just discussed, taxes collected from business are borne by people, either in terms of reduced earnings and returns on investments received by employees or owners of the business or increased costs to the consumers of the businesses products or services.

If we think in terms of taxes being borne either by the producer or consumer of a good or service, we can next consider which of these two parties bears the burden of a tax. In terms of labor markets, the producer of labor is the employee; the consumer is the employer or firm. Legally or statutorily, we can collect or assess taxes from either the consumer or producer of a good or service. Thus, for example, statutory responsibility for property taxes rests with the owner (producer) of property as does statutory responsibility for the income tax. General sales taxes, though collected from businesses, might be thought of as statutorily assessed on consumers as they are explicitly reported in the final sale, while excise taxes on fuels and alcoholic beverages, however, might be considered statutorily assigned to businesses as these taxes are not reported in the final sales price.

Economic theory argues that regardless of from whom the tax is collected, the *statutory incidence* will have no bearing on who actually bears the burden of the tax. Rather the burden will be defined by the *economic incidence* of the tax.

This can be illustrated by considering a simple example of taxing gasoline. Suppose that in the absence of taxes the net (and gross) price of gasoline was $1.50 a gallon. Then, suppose that a tax of $0.50 was imposed per gallon of gasoline to be collected

from the producer (service station) and not reported to the consumer. As a result of the imposition of this tax we would expect the gross price of gasoline paid for by the consumer to increase and range from $1.50 to $2.00 a gallon. Suppose that the new price at the pump were $1.90. In this case, $0.40 per gallon or 80% of the incidence of the tax is borne by the consumer while $0.10 or 20% is borne by the producer as they now receive a net price of $1.40 ($1.90 - $0.50) per gallon. Instead, suppose that the tax is collected from the consumer (perhaps gasoline consumption is reported and then a tax bill is sent to the consumer). Then, economic theory argues, we would observe a price of $1.40 now at the pump because consumers have to pay an additional $0.50 in taxes assessed to them directly making the effective price again $1.90.

If the economic incidence of the tax is not determined by whether we collect taxes from the consumers or producers, what does determine the incidence? Economic theory suggests that the *price elasticity* of demand and supply for a product will determine how much of a tax will be borne by consumers and producers. The *price elasticity* of demand or supply refers to how responsive the quantity demanded by consumers or supplied by producers is to changes in the price of the product. Formally, the *price elasticity of demand* is "the percentage change in quantity demanded divided by the percentage change in price." Thus, a price elasticity of demand equal to -.5 would mean that a 10% increase in price would reduce the quantity demanded by consumers by 5%. The *price elasticity of supply* is defined analogously. Thus if the price elasticity of supply were 2, a 10% increase in price would increase the quantity supplied by 20%.

Formally it can be shown that the incidence of the tax, that is, the share borne by

producers is determined by the formula $-\dfrac{\varepsilon_D}{(\varepsilon_D + \varepsilon_S)}$ where ε_D is the price elasticity of de-

mand and ε_S is the price elasticity of supply. Then if the demand for a product is com-

pletely unresponsive to changes in prices or *inelastic* ($\varepsilon_D = 0$) the price received by pro-

ducers is unaffected by the tax and they bear no incidence. The same result of zero

incidence is obtained if the price elasticity of supply becomes very large or *perfectly*

elastic. In contrast, if the supply is *inelastic* ($\varepsilon_S = 0$) or demand is very elastic, the burden

of the tax is fully on producers with $-\dfrac{\varepsilon_D}{(\varepsilon_D + \varepsilon_S)} = -1$. The incidence borne by producers

for intermediate ranges of values for the elasticities is found in *Table II.1*. Note that in

the table, when the elasticity of demand and elasticity of supply are equal, the tax is

borne equally by consumers and producers (50% of the burden is on producers). Note

that, while we refer to consumers and producers, and may think in terms of excise

taxes, the same relationship holds for taxes on earnings. In this case, as mentioned

before, the consumers are firms purchasing labor and the suppliers are their employees

(or potential employees) supplying labor. Thus, if the supply of labor is relatively un-

responsive to changes in wage rates (low elasticity) and the demand for labor by firms

is relatively responsive (large negative elasticity) the incidence of taxes on earnings, in-

cluding income and payroll taxes, are borne by labor and not shareholders of firms or

final consumers of the firm's products.

Table II.1: The Determinants of Economic Incidence

		Elasticity of Supply								
		0.25	0.5	0.75	1	1.5	2	5	25	50
Elasticity of Demand	-0.25	50	33	25	20	14	11	5	1	0
	-0.5	67	50	40	33	25	20	9	2	1
	-0.75	75	60	50	43	33	27	13	3	1
	-1	80	67	57	50	40	33	17	4	2
	-1.5	86	75	67	60	50	43	23	6	3
	-2	89	80	73	67	57	50	29	7	4
	-5	95	91	87	83	77	71	50	17	9
	-10	98	95	93	91	87	83	67	29	17
	-25	99	98	97	96	94	93	83	50	33
	-50	100	99	99	98	97	96	91	67	50

That economic theory predicts that assignment of statutory incidence has no bearing on the actual economic incidence of a tax has important implications for the methodology and conclusions of empirical studies of the impacts of state and local policies on economic development and on property values. First, it suggests that when examining how tax policies might affect firm location and employment decisions, it is probably inappropriate to focus only on taxes that are statutorily assessed to firms or businesses. While the corporate income tax may be assigned statutorily to the owners of corporations, its economic incidence may be on incurred by employees in the form of lower wages. Thus, it is not necessarily the case that increases in the corporate income tax in a state will necessarily increase costs of production there – the tax increase is offset by a decrease in wages. Alternatively, increases in taxes in a state borne by households including income and residential property taxes may be borne by firms within the state. Workers, when faced with higher taxes in the state, may only continue

to work and reside in that state if wages increase to offset the higher taxes. Thus, these taxes on households are passed onto firms in terms of higher wages and do affect the cost of business within a state. Then it follows that all taxes may effect the employment and firm location and most studies on taxes and economic development consider a broad range of taxes that include those assigned both to firms and households.

A second literature concerns the impact of state and local fiscal policies on property values with a particular focus on property taxation. While not usually couched in these terms, the extent of the impact of taxes on property values found in these studies is simply a statement of the incidence of the property tax. Little negative impact of tax increases on property values would indicate that the consumer (renter) of property bears the burden; large reductions in property values as a result of tax increases would indicate the owner of property bears the incidence of the tax.

II.C *Taxes and Efficiency: The Impacts of Taxes on Quantity*

Neoclassical economists often speak of the virtues of competitive, unregulated (and untaxed) private markets. The desirable aspects of market provision of goods and services include low cost production due to competition among supplies and incentives for firms to produce goods and services desired by consumers. More formally, and more generally, under the appropriate conditions, competitive private markets produce the *efficient* quantity of a good or service, the level that maximizes the *net benefit* to society from that good, the difference between how much consumers value (are willing to pay) for good and its costs of production.

If markets are functioning well, and therefore are producing efficient quantities of goods and services, taxes and subsidies distort market prices and signals will result in inefficiency – the gain in tax revenue is less than the loss in net benefit to consumers and producers in that market.

Since taxes are required to finance public expenditures, economists, when evaluating taxes, focus less on the creation of inefficiency, a characteristic of all taxes, and more on the magnitude of the inefficiency, what economists refer to as the *excess burden* of the tax. The distortion or excess burden of a tax is the product of two factors: 1) the magnitude of the tax rate and; 2) the change in market output of the good as a result of the tax. If a tax has no effect on the market provision, because either demand or supply for the product is completely inelastic, the tax would have no excess burden; only if and to the extent that a tax changes (reduces) output does it lead to an inefficiency. The magnitude of the tax indicates how large a wedge the tax places between how much consumers are willing to pay for a good and the cost of producing that good – the greater this wedge, the more in lost benefits from trades between consumers and producers.

While the determination of the extent of excess burden associated with a tax is frequently the objective of studies of taxes by economists, this is not the objective of the studies on taxation we review in this report. Instead, these studies generally focus on the impact of taxes on output, generally the output of the labor market, employment. However, even though excess burden is not the focus of these studies, the results of these studies do offer some insight into the extent of excess burden associated with state

and local fiscal policies. Little evidence of changes in employment as a result of tax increases would suggest little in the way of excess burden; large changes in employment would suggest the possibility of significant excess burden.

As with incidence, the impact of a tax on the output in the market depends on both the price elasticity of demand and supply for that product with the percentage change in output due to the imposition of an ad-valorem tax of T (%) given by

$\frac{-\varepsilon_D \varepsilon_S}{(\varepsilon_D - \varepsilon_S)}T$. Thus, if the term $\frac{-\varepsilon_D \varepsilon_S}{(\varepsilon_D - \varepsilon_S)}$ is equal to .5, the imposition of an ad-valorem tax of 20% (.20) would reduce quantity by 5%. Note that if either the supply or demand for the good or service is inelastic ($\varepsilon_D = 0$ or $\varepsilon_S = 0$) output is unchanged by an increase in taxes. In *Table II.2*, we provide a summary of the relationship between the price elasticities of demand and supply and the percentage change in output as a result of the imposition of a 20% tax on a good. While the incidence of a tax depends on the relative elasticities of demand and supply, the impact of the tax on output in a market depends on the product of the two elasticities. Increases in the responsiveness of either or both producers and consumers to price changes will increase the impact of taxes on output.

While the studies we review in this report generally focus on the change in output or employment due to taxes without regard to whether the magnitude of this response is due to supply or demand factors, as *Table II.2* suggests, evidence of large reductions in employment would probably indicate high elasticities for both the demand and supply of labor. However, lack of any significant response to the imposition of taxes can be attributable to unresponsiveness (inelasticity) of either, or possibly both,

supply and demand for labor. While firms may be extremely mobile, if their employees are not, then the taxes on firms are passed back to the immobile employees in terms of reduced wages. Thus, costs to firms do not significantly increase as a result of the increase in taxes.

Table II.2: The Determinants of Changes in Output due to the Imposition of a Tax

		Elasticity of Supply								
		0.25	0.5	0.75	1	1.5	2	5	25	50
Elasticity of Demand	-0.25	-2.5	-3.3	-3.8	-4.0	-4.3	-4.4	-4.8	-5.0	-5.0
	-0.5	-3.3	-5.0	-6.0	-6.7	-7.5	-8.0	-9.1	-9.8	-9.9
	-0.75	-3.8	-6.0	-7.5	-8.6	-10.0	-10.9	-13.0	-14.6	-14.8
	-1	-4.0	-6.7	-8.6	-10.0	-12.0	-13.3	-16.7	-19.2	-19.6
	-1.5	-4.3	-7.5	-10.0	-12.0	-15.0	-17.1	-23.1	-28.3	-29.1
	-2	-4.4	-8.0	-10.9	-13.3	-17.1	-20.0	-28.6	-37.0	-38.5
	-5	-4.8	-9.1	-13.0	-16.7	-23.1	-28.6	-50.0	-83.3	-90.9
	-10	-4.9	-9.5	-14.0	-18.2	-26.1	-33.3	-66.7	-142.9	-166.7
	-25	-5.0	-9.8	-14.6	-19.2	-28.3	-37.0	-83.3	-250.0	-333.3
	-50	-5.0	-9.9	-14.8	-19.6	-29.1	-38.5	-90.9	-333.3	-500.0

III. The Implications of *Inter*jurisdictional Mobility on Tax Incidence and Impacts

The framework for tax analysis briefly summarized in the preceding section applies to state and local taxes as well as federally-administered taxes. However, a key distinction between federal and state and local taxes is the possibility of tax avoidance through mobility. While high federal taxes could conceivably and may possibly lead to emigration for some, it is certainly more costly and less likely to be as important as the possibility of migration from one state to another or from one locality to another within a metropolitan area to avoid higher taxes. For example when considering the impacts of federal income taxation, any elasticity of labor supply is likely to be attributed to

changes in the labor supply of individual workers or possibly changes in labor force participation. When considering the impacts of state income taxation, the elasticity of labor supply is likely to be attributed to migration from one state to another as a result of tax changes, rather than changes in individual labor supply, though this may happen as well.

III.A   *The Tiebout Hypothesis*

In addition to potentially increasing the responsiveness of labor supply and demand, as well as the demand and supply for other outputs to changes in taxes, inter-jurisdictional mobility may lead to a more efficient mix of taxes and public services as suggested by Charles Tiebout in a paper published in 1956 in the <u>Journal of Political Economy</u>. In this seminal paper, Tiebout introduced the notion that states and localities could be viewed as competitive "clubs" providing a mix of public services and taxes to finance them. If people and business capital are mobile among states or localities, then Tiebout argued that state and local governments should be able to attract both residents and businesses by offering desirable tax/public service bundles. Tiebout argued that this competitive framework could potentially lead to both an efficient mix of public services and an efficient sorting of people and businesses among localities and states.

Tiebout's paper is brief (seven pages) and very informal in style. In the fifty years following the publication of this paper, a voluminous literature based on this article has arisen to formalize and extend the limited analysis that Tiebout offered. While some of this research will be discussed in this report, most of it is only tangential to our interests. Two central tenets of the Tiebout hypothesis, as generally interpreted,

are important to understanding both the methodology and findings of the literature we review. These central tenets might be summarized as:

1) Households (and firms) are mobile among jurisdictions, be they states or localities, and will choose where to locate among these jurisdictions based on the taxes and public services provided by the jurisdiction, as well as non-government provided amenities;

2) Sorting of households and firms among jurisdictions can lead to both an efficient sorting based on preferences for services and taxes, as well as an efficient provision of public services by jurisdictional governments.

III.B   Implications of the Tiebout Hypothesis

Tiebout, and others that followed, argued that locational decisions are influenced not only by taxes but also by public service provision. That both taxes and public services should matter in locational decisions of both firms and households suggests that any studies that attempt to examine how taxes influence employment and household or firm location decisions also need to consider the impact of public services. This requires, then, quantification and data on public service provision.

As discussed in more detail in our review of studies on fiscal policy and property values, efficient fiscal policies would entail that the incremental benefits to residents and firms in a jurisdiction from increases in public expenditures should be exactly offset by the incremental cost to them of financing these expenditures with taxes. That these incremental benefits and costs should be equated for fiscal policies to be efficient means that with efficient policies, small balanced-budget changes in expenditure/tax increases

should have little impact on the movement of firms and residents among states or on property values. Thus, the insignificant, or even positive, impacts found in early studies of the impacts of taxes on employment or other measures of economic activity might be due to the failure to control for expenditures – what these results may suggest is that the increase in taxes, also associated with a balanced-budget increase in public services not quantified, is approximately efficient. Analogously, in the literature on the impact of state and local fiscal policies on property values, a finding of no impact of the property tax on property values when no measure of public expenditures is included in the analysis is viewed as evidence of the efficient provision of public services.

If, as the Tiebout hypothesis suggests, changes in employment or other economic activity due to changes in state and local taxes are primarily the result of inter-jurisdictional mobility, the inefficiency or excess burden associated with a state tax is not directly related to the change in state output due to that tax as suggested in the pre-ceding section. If, in this case, unlike the case with federal taxes, the loss in tax base in one jurisdiction, the employment or capital (firms) there, leads to an equal increase in the tax base of competing jurisdictions, there is no excess burden from the imposition of the state tax or, at a minimum, the excess burden is overstated. Thus, while the impact of increases in state and local taxes on employment or capital within a jurisdiction may be of interest, it is inappropriate to equate them directly with excess burden. Further, as we discuss in our review of the literature on tax competition, if state and local governments ignore how their tax decisions positively affect their neighbors' tax bases, as is likely, state and local taxes will be inefficiently set.

IV. The Impacts of Fiscal Policies on Employment and Economic Activity

IV.A   Outline

State and local governments have a plethora of policies designed to stimulate economic activity and development with employment generally the primary focus of these policies. Not coincidentally, an extensive literature examining the impacts of these state and local development policies has developed in the past forty years and continues to grow.

While this literature is not by any means young (the initial study of the impacts of fiscal policies on employment is generally attributed to John F. Due in 1964), the methodology used, the nature of the data, and even the findings have changed significantly in the past forty years. As we discuss in more detail later, most of this literature deals with the "local" impact of policies, that is, on how tax rates in a region affect economic development in only that region. Because of the significant changes in both methodology and data, both in terms of the time of analysis and quality, as well as some of the focus of these studies, we review this literature to determine the consensus, if any, regarding conclusions to be drawn from these studies regarding these "local" effects. Unlike some of the reviews of this literature published in scholarly journals or books, we do not attempt to provide a comprehensive discussion of this very extensive literature, though we do provide several tables summarizing a large number of studies in this area. Instead, our review is selective based on what we perceive as both the quality and relevance of the study. Thus, early studies of the impacts of state taxation on employment that do not account for the mix and level of public services would be of

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less interest and focus than those studies that account for both taxes and public services. Studies that include aggregate tax measures such as total state taxes per capita might be of less relevance than studies that provide evidence of how different types of taxes affect employment or economic growth (for example, Harden and Hoyt, 2002).

Following the practice undertaken both in the studies of taxes and business location and the few studies that have offered reviews of this literature, the measure that we use of the magnitude of the effect of taxes on economic activity is the elasticity of the economic activity with respect to the tax rate, or what we refer to as the tax elasticity. The concept of elasticity, also discussed in *Section II*, provides a measure of how much one variable (employment, for example) responds to another (the tax rate) in percentage terms. Formally we have the elasticity for employment as:

$$E = \frac{\%\Delta Employment}{\%\Delta Tax} \qquad \text{(IV.1)}$$

Thus, if the elasticity is found to be -.5, then a 10% change in the tax rate would decrease employment by 5%.

Fiscal policies to encourage local economic development are somewhat varied, though all are intended to reduce firms' costs and attract them to or retain them at a location. The incentives offered firms may be broad based, when all firms or potential arrivals to the location qualify, or they may be targeted to a subset of firms. Common examples of the former are reductions in the state corporate income tax, sales tax, or property tax. The latter tend to be more varied. Examples are subsidized credit (through tax exempt borrowing, government-guaranteed credit, or state-supported

venture capital funds), state operated training programs for firms, job subsidies, enterprise zones, and a variety of tax exemptions, credits, abatements, and special treatments.

Studies of the effects of these policies have investigated a number of issues. Many have examined the extent that the incentives alter firms' costs, based on idea that for the policies to have a substantial effect they ought to have a substantial effect on the affected firms. The primary issue of concern for most studies is the effect on the local economy. Typically, studies focus on the effects on employment, the size of the manufacturing sector, growth in state income, or location of new plants.

These studies vary widely in the type of data used, the time studied, the quality of data, and statistical methodology. After a brief discussion of the findings of several studies reviewing and comprehensively analyzing this literature, we discuss in very general terms the nature of the data and statistical methodology used in these studies. At the same time, we discuss some of the limitations of the alternative methodologies and issues involved in attempting to estimate the influence of taxes as well as other government policies.

We begin by discussing very general conclusions arrived at from this extensive literature by discussing two important and comprehensive reviews of the literature, one by Timothy Bartik in 1991 and another by Michael Wasylenko in 1997. While these reviews cover the vast majority of this literature, a few important studies have been undertaken since these reviews were completed and these are discussed as well.

IV.B   The Basic Methodology of Estimating the Impacts of Taxes

Unlike the natural sciences, where it is often possible to determine the impacts of the change in a single variable within in a controlled environment, economists generally do not have this opportunity. Changes in economic variables, such as tax rates, and their impacts on economic activity such as employment or plant location obviously can not be examined within a controlled environment with complete control of other confounding factors such as changes in public service policies or changes in general economic conditions (a recession or accelerated growth). Instead, economists use data on actual economic conditions and statistical techniques to examine the relationship between the two or more economic variables. Specifically economists use the technique of *regression* analysis to analyze how certain variables or factors *(independent or explanatory variables* or *regressors)* affect another variable, the *dependent variable.*

Within the context of the studies we are reviewing, the dependent variable is some measure of economic activity (employment, gross state product (GSP), number of manufacturing plants) or more often a change in economic activity (the change in employment, plant relocations, births, deaths, growth in GSP). The independent variables would include the primary variable of interest, the measure of the tax rate, but also would include measures of the confounding factors, measures necessary to include in the regression to isolate the effect of taxes on the measure of economic activity.

Then with data on the measure of economic activity for the region, in these studies, usually a state, locality, or metropolitan area, regression analysis is used to

estimate an equation of the form

$$E_{it} = a_0 + a_1 Tax_{it} + a_2 Service_{it} + a_3 X_{it} + \varepsilon_{it} \qquad\qquad (IV.2)$$

where i denotes a specific region (state or locality) and t denotes year. E_{it} is the measured economic activity, Tax_{it} is the measure (or measures) of taxes, $Service_{it}$ is the measure or measures of public services, and X_{it} is the measure of other factors that might affect economic activity in the region such as wage rates, unionization rates, and education levels, for example. The term ε_{it} represents an idiosyncratic "error", which can be interpreted as the effect of factors that might affect the value of the dependent variable but can not be quantified. Then regression analysis entails using the data on the regions' values for these variables to estimate this relationship, that is, to find values for the α terms. Regression analysis (ordinary least squares) picks these values to minimize the "mean-squared error," the squared-sum difference between the actual value of the dependent variable and the value predicted by the equation. Critical to the reliability of these estimates is the assumption that the error term is uncorrelated with any of the independent variables. This, as we discuss later, is one of the primary concerns related to the reliability of estimates of tax impacts on employment.

As we have described the model, we have data for a number of regions for a period of several years. Data sets comprising data that contains both multiple time periods and different units (people, states, firms) are referred to as "panel" data sets. In contrast, studies using data on a single unit, for example, the United States, but for over some period of time, are referred to as "time-series" analyses. Finally, studies using

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data for a single period (a year) but for a number of units of observations (the states or counties in the U.S.) are referred to as "cross-sectional" analysis.

Virtually all studies examining the impacts of taxes on economic activity use panel data sets for what we believe are obvious and important reasons. Attempts to discern the impacts of taxation on employment or economic activity using time-series data, for example the level employment in Kentucky from 1969- 1995, would be difficult for several reasons. First, there tends to be relatively small changes in tax rates within a single state, with more variation occurring among rather than within states. Second, it is unclear how and whether it is appropriate to generalize the results found by examining a single state or locality to other states and localities. Use of cross-sectional data, for example, state employment for all 50 states in 1996, might provide the opportunity to observe more variation in tax measures, but the reliability of estimates from cross-sectional data is questionable. The problem with the use of cross-sectional data is that much of what is likely to explain the level of employment in a state is not quantifiable and would be placed in the error-term. The large error component reduces the reliability of the estimates but more importantly it is also very likely that error term (ε) is correlated with the independent variables.

Panel data can remedy some of the problems associated with the use of both cross-sectional and time-series data. This can be seen by slightly revision equation (IV.1)

$$E_{it} = a_0 + a_1 Tax_{it} + a_2 Service_{it} + a_3 X_{it} + \mu_i + \varepsilon_{it} \qquad (IV.3)$$

The difference in equations IV.1 and IV.2 is the inclusion of μ_i, a "fixed-effect," in IV.2. Essentially this is another part of the error term that does not vary over time. For example, the size, location or geographical amenities of a state, would not change over time. However, these factors might be correlated with independent variables such as the taxes and public services or demographic characteristics of the population, leading to difficulties in estimation. However, with data on states that varies over time, we can essentially difference out the effect of μ_i in the estimation using what are referred to as fixed-effect estimators.

The simple models described above might be referred to as "equilibrium" models in which the current level of employment or other measure of economic activity depends on the current level of taxes. This characterization of the relationship between economic activity and taxes suggests immediate responses to changes in taxes, a highly unlikely proposition given the immobility of some capital and significant mobility costs. One option, instead, would be to include not only the current tax rate but also the tax rates from previous years as explanatory variables. An alternative used by Helms (1985), Carrol and Wasylenko (1994), Harden and Hoyt (2002, 2005) is the "partial-adjustment" model. Suppose that there is an "adjustment" process in determining employment. Let E_{it}^* represent the ideal or long run level of employment in state i in period t given its taxes, public services, and other variables of importance in that year. However, assume that employment will not reach this level immediately but adjusts gradually, with

$$E_{it} = E_{it}^* + (1-\lambda)E_{it-1} \qquad\qquad (IV.4)$$

Actual employment in period t (E_{it}) depends on the "ideal" employment (E_{it}^*) and employment the year before (E_{it-1}) with this relationship depending on the rate of adjustment (λ). A value of one for λ would mean no adjustment; as the value gets closer to zero the longer the period of adjustment. Then based on this partial adjustment model we can modify equation *IV.2* to become

$$E_{it} = a_0 + a_1 E_{it-1} + a_2 Tax_{it} + a_3 Service_{it} + a_4 X_{it} + \mu_i + \varepsilon_{it} \qquad (IV.5)$$

where we include the measure of economic activity in the previous year as an explanatory variable. Finally, one other modification, suggested by Marks et. al. (2000) is to examine growth rather than levels of employment or economic activity. Then we can modify (IV.4) to obtain

$$\Delta E_{it} = a_0 + a_1 \Delta E_{it-1} + a_2 Tax_{it} + a_3 Service_{it} + a_4 X_{it} + \mu_i + \varepsilon_{it} \qquad (IV.4)$$

where ΔE_{it} and ΔE_{it-1} is the growth or change in employment from year t-1 to year t and year t-2 to year t-1 respectively.

IV.B.1 Some Methodological Concerns

There are a number of issues that arise when attempting to actually estimate the relationship between taxes and economic activity within a region. Here, we provide a brief discussion of some of these issues, suggest how they might affect the confidence placed on the results of studies and provide some insights into how these issues have been addressed in studies on taxes and economic development.

How to Measure Taxes?

The first issue to be addressed is how are taxes to be measured? Within the literature two approaches are generally taken. Either use the explicit statutory rate or create some other measure such as revenue per capita or as a percentage of income.

The difficulty with the use of statutory rates is that for important state taxes such as the individual and corporate income tax rate there is no single tax rate. For property taxes, difficulties arise because taxes are based on assessed rather than actual property value. A problem with almost all taxes is that bases are not consistent across states or localities. Significant exemptions from the sales tax or income tax base mean that the burden of these taxes should be less.

One way to interpret statutory rates is that they give the *marginal* tax rate, that is, the tax on additional dollar of income or purchases subject to a tax. In contrast, per capita taxes or taxes as a percentage of income might be considered *average* tax rates. Economists argue that when considering the impact of taxes on individual behaviors such as labor supply or savings, marginal rates are relevant. For decisions about where to live or locate a business, average tax rates, taxes per capita or as a percentage of income, are probably more relevant.

In addition to the issue of using the statutory marginal rates or average rates created by dividing revenue by some base, the question of what taxes should be considered has to be addressed. The few studies using statutory rates will generally use "business" taxes, taxes statutorily assigned to businesses. Frequently in studies using average or effective tax rates, taxes are aggregated together. Thus, rather than estimating the impact of a specific tax such as the state corporate income tax or local

property taxes, the study may simply define its measure of taxes as total taxes per capita or as a percentage of GSP. As discussed in *Section II*, the economic and statutory incidence of taxes are not necessarily the same. Thus, while the individual income tax may not be a tax on businesses, it is likely to affect employment and firm location by affecting the required compensation of employers. This argues for including all taxes in studies; however, aggregating all taxes into a single measure implicitly means that increases in different taxes would have the same impact on employment, a proposition that is also not likely to be true.

The Endogeneity of Government Policies

In addition to issues concerning how to measure taxes, another concern is the *endogeneity* of taxes – not only do tax rates affect economic activity but the level of economic activity affects the tax rate. Areas with little tax base will have higher taxes. This is particularly problematic when an average tax rate is used as the measure since the numerator of the measure is simply tax revenue that clearly depends on economic activity. In regression analysis, this endogeneity generally requires the use of an instrument variable, a variable correlated with the tax rate, but not directly correlated with the dependent variable, economic activity. Alternatively, many studies use the tax rate from the preceding year as a measure of the tax rate.

Concerns over endogeneity are not only about taxes but public services as well, and similar techniques, either the use of instrumental variables or lagged values, are used to reduce the impact of endogeneity on the estimated impacts of these variables.

Unobserved Characteristics of States and Localities

As discussed earlier, a problem with the use of cross-sectional data is the fact that many factors that influence the level or change in employment or other measure of economic activity in a region are likely to be unobserved or difficult to quantify and therefore are "omitted" from the estimation. The failure to include in the regression factors likely to affect the dependent variable will lead to biased estimates and is referred to as omitted variable bias. While some factors may not be quantifiable at all, other factors, such as public services, can be imperfectly measured. In the case of public services, the measure is generally per capita expenditures on the service with little attempt at controlling for or measuring quality.

Also, as was discussed earlier, the use of panel data with the appropriate econometric techniques allows for some control for these unquantifiable factors – at least those that do not vary over time. Early studies frequently did not make much effort to provide any measures of public services or employ panel-estimation techniques. In general, the estimated impacts of taxes on economic activity in these studies tended to be quite small, undoubtedly due to omission of public service measures or control for "fixed" effects.

Because of concerns of an omitted variable, in our discussion of results we primarily focus on those studies which include fixed effects or a lagged dependent variable and which provide some measure of public goods.

IV.C   The Impact of Taxes on Economic Activity

Following Bartik (1991) and Wasylenko (1997), we consider studies that consider the impact of the general level of taxes or specific taxes separately from studies that

focus on special tax incentive programs such as tax incremental financing (TIF), enterprise zones, or plant-specific tax incentives. Within the class of studies examining the general level of taxes, we consider studies that focus on inter-state or inter-metropolitan tax differences from those studies that focus on intra-state or intra-metropolitan tax differences. Finally, we discuss the impacts of public services on economic activity in section *IV.E.*

Our study draws heavily on the earlier and very extensive reviews of this literature by Timothy Bartik (1991) and Michael Wasylenko (1997) as well as Phillips and Goss (1995). In addition to summarizing and discussing some of the findings of these studies we provide a brief summary of more recent studies.

IV.C.1 Inter and Intra-State and Inter and Intra-Metropolitan Studies

Do taxes affect business activity? The answer from the earliest studies might have been ambiguous with some studies finding statistically-significant impacts while others not. However, the answer from most of the recent studies, employing fixed-effect estimation with panel data and providing at least some measures of public services is yes – taxes do affect the level of employment, employment growth, and firm locations within a state or metropolitan area. While the evidence of numerous studies suggests that taxes do have a negative and significant impact on employment or other measures of economic activity, both the magnitude and implications for public policy are matters for dispute among researchers.

Bartik (1991) provides the most comprehensive discussion on the literature on taxes and economic development up to the time of its publication. Bartik reviews and

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compiles the findings of 84 studies on taxes and economic activity and, when possible, reports the estimated tax elasticity. These studies and the reported tax elasticities, as well as the time period and level of aggregation for the data, are listed in *Table IV.A.1* for the inter-state and inter-metropolitan studies supplemented by studies since 1991. *Table IV.A.2* lists the intra-state and intra-metropolitan studies reviewed by Bartik, again with supplementation of more recent studies.

IV.C.2 Inter-State Studies

In his examination of these studies, Bartik finds that 70 percent of the 57 studies examining interstate business location report statistically-significant tax effects for at least one tax and 60 percent of the studies on intra-state or intra-metropolitan business location find a statistically-significant tax effect. The range of the estimated tax elasticities for these studies is from -1.40 to .76 with a mean of -.25 and a median of -.15. While the range for all studies is quite broad, Bartik argues that a more reasonable range is from -0.1 to -0.6 for the tax elasticity. When considering only the eleven studies with controls for fixed effects the range for elasticities is from -1.02 to 0 with a mean elasticity of -.44 and a median of -.35. Studies that control for public services but not fixed effects have a mean elasticity of -.33 and a median of -.27.[1]

Phillips and Goss (1995) examine this same set of studies. However, they provide a more formal statistical analysis in an attempt to clarify why the range of tax elasticities estimated in these studies is so broad. They find that the reported tax elasticity for inter-state location studies is -.216 with studies including fixed effects

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[1] See Bartik (1991), Table 2.3, page 40-41.

having a lower estimated elasticity of -.267, though this is not statistically different. Studies including public services have an elasticity twice that of studies including neither fixed effects nor public services, with an estimated tax elasticity of -.448.

The range of tax elasticities reported by Bartik (1991) is based on several different measures of economic activity, including employment, employment growth, manufacturing employment growth, growth in income or gross state product and plant locations. Bartik also ignores any differences in the type of tax examined when calculating his tax elasticity. Wasylenko (1997) argues that this aggregation of elasticities for different measures of business activity and different types of taxes is inappropriate, as the tax elasticities are potentially quite different. Wasylenko finds that when an overall tax measure, such as total taxes as a percentage of income, is used, the mean tax elasticity is -.58 for studies with statistically-significant tax effects. For business tax elasticity, where the business tax is either the corporate income or property tax, he finds an average elasticity of -.11. Wasylenko also finds that total employment appears more responsive to total taxes than manufacturing employment or to income or gross state product. *Table IV.1* summarizes the findings for interstate studies reported by both Bartik (B), Wasylenko (W), and Phillips and Goss (P/G).[2]

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[2] Table IV.1 uses information from Bartik (1991), pages 40-41, Table 2.3, Wasylenko (1997), page 46, Table 2, and Phillips and Goss (1995), page 328, Table V.

Table IV.1: Estimated Tax Elasticities, Inter-State Studies

Measure of Business Activity	Tax Elasticity for Total Taxes	Tax Elasticity of Business Taxes
All Measures (B)	-.22 (-.73 to .04)	
All Measures using "Fixed Effects" (B)	-.43 (-.88 to -.07)	
All Measures using Public Services (B)	-.33 (-.77 to .0)	
Employment with Fixed Effects and Public Services (P/G)	-.78 (-.81 to -.75)	
Employment or Employment Growth (W)	-.58 (-.85 to 0)	-.11 (-.16 to 0)
Manufacturing Employment (W)	-.10 (-1.54 to .05)	(-.26 to 0)
Investment (W)	-.60 or 0 (-1.02 to .54)	-.20 (-.36 to -.10)
Gross State Product (W)	-.07 (-.88 to .27)	-.14
Births of Manufacturing Firms (W)	-.18 (-40 to 0)	-.20 (-15.7 to .6)

Since Bartik's review there have been only four studies of the impacts of interstate tax competition: Goss and Phillips (1994), Carroll and Wasylenko (1994), Harden and Hoyt (2002) and Hoyt and Harden (2005). While not included in Bartik's survey, the results of the studies by Goss and Phillips and Carroll and Wasylenko were included in Wasylenko's review. Carroll and Wasylenko (1994) examines the growth in manufacturing employment from 1967 to 1988 with a focus on the impact of property, corporate, sales and personal income taxes. They also divide the sample into two periods, an early regime from 1967 to 1976 and a later regime from 1978 to 1988. They find that the property tax has a significant negative impact on non-agricultural employment in both periods and the personal income tax has a significant negative impact in the latter period. However, when they consider the impact on manufacturing employment, they find all taxes had significant negative impacts in the early period while none did in the latter period. Carroll and Wasylenko argue that this difference in

the impact of the taxes for the two different periods might explain some of the differences in the findings of studies.

Goss and Phillips study focuses not as much on taxes as it does on the impact of economic development spending. Their measure of taxes is simply total tax revenue as a percentage of gross state product. Examining two year employment growth for three periods (1982-84, 1986-88, and 1990-92) for 37 states, they find extremely large tax elasticities, -1.65 in one specification and -1.88 in another. Interestingly, they also find significant and large positive impacts of economic development agency spending on economic growth with an elasticity of .2.

Two more recent articles by William Hoyt and William Harden also examine how state taxes, measured as a percentage of income, affect employment or employment growth. In Harden and Hoyt (2002), they estimate the relationship between employment and growth while taking into account a balanced-budget condition. By doing so, they are able to calculate how the impact of a balanced-budget change in taxes would affect employment. They find a significant negative effect for the corporate income tax with a balanced-budget elasticity of -0.17, meaning that if the corporate income tax were reduced by 10% with either the sales or income tax increased to keep revenues constant, employment would increase by 1.7%.

Hoyt and Harden (2005) examines the impact of state and local taxes on metropolitan county employment. In this study, Hoyt and Harden divide counties into those on borders or in metropolitan areas crossing borders and those in interior metropolitan areas. They find distinctly different impacts of taxes in the two areas. In border

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counties, employment is adversely affected by the corporate income tax and individual income tax while for interior counties local taxes and individual income taxes have statistically-significant negative impacts.

One other study bears mentioning, though it is not a study on taxes and employment per se, but rather on general business policies. Holmes (1998) matches counties along borders of state with right-to-work laws and those that do not and compares the growth in manufacturing employment in these matched counties. Holmes finds that in counties in states that have the right-to-work laws manufacturing's share of employment is one-third higher than the adjacent county in the state without the right-to-work laws.

IV.C.3 Intra-State and Intra-Metropolitan Studies

Most studies of inter-state business location focus on aggregate measures of taxes (total tax revenue as a percentage of income) or on state corporate, sales and individual income taxes. In contrast, intra-state studies are confined to examining difference in local taxes, generally local property taxes. Not surprisingly, in these studies the estimated tax elasticity is greater (more negative) than was found in inter-state studies. This is not surprising as mobility costs should be lower within a state or metropolitan area and firms can potentially still serve the same market even if they move to an adjacent community.

Bartik reports an estimated tax elasticity of -1.36 for what he refers to as "intra-area" studies and -1.91 for those "intra-area" studies with specific community data. Wasylenko reports similar findings when he separates studies of employment or em-

ployment growth from studies using similar measures of economic activity. For manu-

facturing employment he finds a tax elasticity of -.79 (based on one study) and for

location of manufacturing plants an elasticity of -1.59. The results are summarized in

Table IV.2.[3]

We have found only two other studies of intra-metropolitan business location

since the publication of Wasylenko's review in 1997. One is the study by Mark et. al.

(2000) of the determination of both employment and population within counties (and

the District of Columbia) in the metropolitan Washington DC area for the period 1969 to

1994. Their results are fairly consistent with those of earlier studies though the

estimated tax elasticities are quite large, -2.12 for the personal property tax and -2.17 for

the sales tax. The other study is Bollinger and Ihlanfeldt (2003) in which the unit of

observation is share of employment for census tracts within the Atlanta MSA for the

period 1985 – 1997. While the primary focus of this study is on enterprise zones,

statutory sales and property tax rates are also included as explanatory variables.

However, in none of the regressions were the coefficients on these variables significant.

Table IV.2: Estimated Tax Elasticities, Intra-State Studies

Measure of Business Activity	Tax Elasticity of Business Taxes
All Measures (B)	-1.36 (-2.70 to 0)
All Measures using community specific data (B)	-1.91 (-.81 to -1.95)
Employment or Employment Growth (W)	-1.85 (-.16 to 0)
Manufacturing Employment (W)	-.79
Births of Manufacturing Firms (W)	-1.59 (-2.70 to .62)

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[3] Table IV.2 uses information from Bartik (1991), pages 40-41, Table 2.3 and Wasylenko (1997), page 47, Table 3.

IV.C.4 What is the Tax Elasticity?

Given the range of estimates found in the literature as well as the variation in the measures of both taxes and business activity, attempts at providing a single number for the answer to this question are probably ill-advised. What seems clear is that taxes have a small but significant impact on economic activity, particularly employment.

The evidence clearly suggests that economic activity is much more responsive to intra-state differences in taxes than it is to inter-state differences. For inter-state business location decisions, it is not clear how or whether either the type of tax makes much difference in the estimated elasticity. Phillips and Goss (1995) does suggest that the elasticity of income or gross state produce with respect to taxes is lower than the elasticity of employment. While Bartik places a range of -.1 to -.6 with an estimate of -.3, Wasylenko, in his review, argues that a lower rate, approximately -.1 is more realistic and further argues that taxes do not appear to have a significant impact on inter-state business location. Based on a review of what might be considered the better studies, those using fixed-effect estimation and public service measures as controls, the estimated elasticity is greater, approximately -.44. Given that these studies seem to produce higher tax elasticities, it seems reasonable to suggest that an estimated tax elasticity of -.25 to -.5 is not an unreasonable estimate for the impact of taxes on inter-state business location. If this is a reasonable range, then we might reasonably expect that a 10% reduction in taxes, employment should increase by 2.5% to 5%.

While the range of estimated elasticities may be larger for intra-state studies of business location, it is much harder to argue that "taxes don't matter" when comparing

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differences in local taxes. Estimated tax elasticities for these studies, generally using property taxes as the measure of tax burden, are much larger (in absolute value) and are certainly less than -1 (more negative) and closer to -2. Bartik finds an average tax elasticity of -1.91 for studies controlling for community services and characteristics and Wasylenko finds an average of -1.85 for studies using employment or employment growth as a measure of business activity. Thus a reduction of local taxes of 10% could be expected to increase local employment by well over ten percent and probably between 15 and 20 percent.

IV.D   Tax Incentives and Economic Development

A smaller but still significant literature examines the impacts of economic development policies, earmarked for specific geographic regions or specific firms, such as enterprise zones (EZ), tax incremental financing (TIF), and special incentive packages for large firms.

IV.D.1 The Impacts of Enterprise Zones on Economic Activity

Table IV.A.3 lists a number of studies on economic development policies. As inspection of the table suggests, the majority of these studies focus on enterprise zones. As described by Fisher and Peters (1997), enterprise zones are designated areas in which firms located in these zones receive tax incentives such as jobs tax credits or investment credits. Fisher and Peters, using a sample of enterprise zones in 22 states in 1992 provide some comparison of the tax advantages of enterprise zones. From Fisher and Peterson (1997) are the estimated impacts of EZ on hypothetical firms in different manufacturing industries.

Table IV.3: The Impact of Enterprise Zones on Firms

Table 2
The Importance of Enterprise Zone Incentives

Firm:	Furniture	Soaps	Plastics	Autos	Instruments	Average:
New Plant Assets (millions):	$40	$20	$5	$600	$180	16 Firms
42 Cities of 25,000 or More Population with Enterprise Zones (EZs)						
Total EZ tax incentive package	$ 743,711	$366,505	$ 86,654	$ 5,922,955	$2,196,186	$1,639,759
Total incentive package	$1,705,411	829,040	$305,571	$11,666,932	$4,351,090	$3,332,581
State EZ incentives as % of total EZ package	79.1	82.6	80.4	61.9	72.1	69.1
EZ tax incentives as % of all tax incentives	70.8	72.9	73.8	58.6	66.2	52.7
EZ tax incentives as % of total incentive package	43.6	44.2	28.4	50.8	50.5	49.2
Ratios: Incentives within EZs in 42 Cities versus Incentives in 49 Cities without EZs (25,000 or more population)						
Non-EZ tax incentives (available citywide)	2.79	2.54	2.66	2.62	2.91	2.70
Total tax incentive package	9.55	9.37	10.15	6.34	8.62	7.32
Non-tax incentives available citywide	.95	.95	1.24	.90	.95	.95
Total incentive package	2.13	2.08	1.89	3.50	2.95	2.96
For a Representative City in Each State That Has an Enterprise Zone Program (20 states)						
Average State-Local Tax Rate on New Investment (%)						
Outside enterprise zones	7.7	7.1	11.5	13.7	6.0	9.1
Within enterprise zones	6.1	5.7	9.4	11.1	4.9	7.3
Enterprise zone effect	1.7	1.3	2.2	2.6	1.1	1.7
Percent reduction in tax rate due to EZ	21.4	19.0	18.8	18.9	18.0	19.1
Lowest State-Local Tax Rate on New Investment (%)						
Outside enterprise zones	5.1	4.3	7.5	7.0	4.3	5.6
Within enterprise zones	3.4	3.1	4.9	4.1	2.6	3.7
Highest State-Local Tax Rate on New Investment (%)						
Outside enterprise zones	11.6	13.4	17.0	23.9	8.3	14.7
Within enterprise zones	9.6	10.2	15.9	23.8	7.2	13.2

Note: Because only two of the 21 cities under 25,000 population had enterprise zones, we confined the analysis to cities of 25,000 or more. The value of EZ incentives is measured by the difference between the present value of the cash flow attributable to the new plant, after all taxes and tax incentives, and the present value of new plant cash flow given all tax incentives except enterprise zone incentives. The total incentive package includes job training, infrastructure, and general financing programs. Representative cities were given the approximate median property tax rate for that state, and a typical property tax abatement program based on the sample cities in that state. For the definition of tax rates on new investment, see footnote 22.
Source: Fisher and Peters (1996a).

The literature on enterprise zones has followed the practice of determining the cost savings for a hypothetical firm to get some quantitative measure of the potential value to a firm of locating in an enterprise zone. Then, based on the measures of the savings associated with EZ designation, studies generally examine the impact of EZ on economic activity, generally employment. While some studies focus on the impacts in one, or few, enterprise zones, other studies consider a number of zones. Generally the strategy is to compare growth rates, or pre- and post-designation employment for an EZ area to an adjacent area without the EZ designation.

While the findings of the literature on EZ is somewhat mixed, in general, more recent studies such as Bondonio and Engberg (2000) and Boarnet and Bogart (1996), and Oh. et. al. (1990) suggest that enterprise zones have had limited impacts on zone employment. However, studies by Papke (1994), Rubin and Wilder (1989), and Bollinger and Ihlanfeldt (2003) offer some evidence to the contrary. Still, there is little evidence that EZ designation has any significant impact on employment in depressed regions.

IV.D.2 Bidding for Firms

The practice of states or localities to offer significant tax concessions or land acquisition to entice large manufacturing firms to locate within their state or locality is a controversial and highly-publicized issue in state and local taxation. Given the sometimes very secretive negotiations in which states and corporations engage when attempting to determine a site for a large plant, it is not surprising that there are limited empirical studies of this topic. Here we briefly discuss two studies, the study by Bartik (1991) on the impacts of employment "shocks" on long-run economic activity and the study by Greenstone and Moretti (2004) on the location of "Million Dollar Plants".

Bartik (1991) focuses on the impacts of demand shocks in the labor market on long term conditions within labor markets, specifically unemployment and wage rates. He argues that a demand shock for labor, such as might occur if a new manufacturing plant locates in an area, could affect long term wages and unemployment and not merely short-term conditions. His argument is that because labor is not perfectly immobile, a demand shock means that at least some current residents will have to be hired to fill the new positions – it is costly and will take time for other laborers to

relocate to this area. Thus, unemployment in the region will decrease and wages should increase. While unemployment will rise as others move to the area to take the jobs, it will not reach the previous level because the local residents originally taking jobs have acquire some skills that will increase the likelihood of their employment. Bartik finds evidence that a one percent increase in labor demand will lead to an immediate reduction in the unemployment rate of approximately .3 and a reduction of between .05 and .1, six years after the initial shock.

Greenstone and Moretti (2004) obtained data from the corporate real estate journal *Site Selection* on the location of large (Million Dollar) plants as well as one or two runner-up counties. Comparing labor earnings and property values in the "winning" counties (where the plant locates) to the losers (runner-up counties), Greenstone and Moretti find that there is an increase in earnings of 1.5% in the winning counties and an increase in property values of 1.1 – 1.7%.

IV.E   The Effects of Public Services on Economic Activity

In our discussion of the methodology behind estimating the impacts of taxes on economic activity in section IV.C, we discussed the need to include public services to ensure for reliable estimates of the tax elasticity of business activity. Our review of studies on taxes and business location indicates that studies that include measures of public services have significantly different estimates for tax elasticities.

In addition to being an important control in studies of the impacts of taxes on business location, the impact of public services might be of interest in its own right. While somewhat beyond the scope of our study, since most of the studies on the effects

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of taxes on business location also include measures of public services and tax reductions, some mention of the empirical evidence on this issue might be useful.

Here we simply summarize the review of Ronald Fisher (1997) on the effects of state and local public services on economic development. He focuses on three categories of public spending: highways (transportation), public safety and education. Fisher finds that in 15 studies that have a measure of highways, 10 have positive coefficients on the measure of highways and 8 are statistically significant. For public safety, the results are weaker, only 4 of the 9 studies with public safety measures (police expenditures per capita, for example) had positive and significant impacts. Weakest is the relationship between economic activity and educational spending – 6 of the 19 studies with a measure of educational spending had positive and statistically significant impacts on economic activity.

While Fisher notes that the impacts of the public service depend on the measure of economic activity and the estimation technique (fixed effects or not) ,he does not suggest what these differences are. Perhaps most relevant is his assertion, based on his review, that "[o]f all the public services examined for an influence on economic development, transportation services and highway services especially, show the most substantial evidence of a relationship."[4]

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[4] Fisher (1997), page 56.

Table IV.A.1: A Summary of Inter-State and Inter-Metropolitan Studies on Taxes and Business Location

Authors	Year of Publication	Business Activity Measure	Level of Aggregation/Unit of Observation	Time Period	Tax Measure	Fixed Effect Controls	Public Service Controls	Significant Tax Effects	Results/Measures
Hoyt & Harden	2005	Employment	Counties, border separated from interior	1977 – 1997	Income, Sales, Corporate & Local Taxes, % of Income	Yes	Yes	Yes	For borders: elasticity for income tax, -.46 & -.43 for corporate; for interior, -1.7 for local taxes & -0.85 for income tax
Harden & Hoyt	2002	Employment Growth	State	1977-1995	Income, Sales, Corporate & Local Taxes, % of Income	Yes	Yes	Yes, on corporate income tax	Balanced budget elasticity for corporate income tax of -.17
Goss & Phillips	1994	Employment Growth	State	1982-1984, 1986-1988, 1990-1992	State & Local personal taxes, % of income; State Corporate taxes as % of income	Yes	Yes, Infrastructure spending, Economic Development Spending	Yes, personal taxes	-1.647 (without EDS) & -1.875 (with EDS)
Carroll & Wasylenko	1994	Manufacturing Employment by sector & total employment	State	1967-1988	Property, Personal Income, Corporate Income, % of personal income	Yes	Yes	Limited significance	Taxes appear to have less impact on firm location in the 1980's than they did in the 1970's
Couglin, et.al.	1991	# of Manufacturing Foreign Direct Investment	State	1981-83	State and Local Taxes Per Capita	Level of Current Activity	Some	No	-.27 to -.16 (mean, -.21)
Eberts	1991	# of New Plant Openings	Industry by MSA	1976-78		Level of Current Activity	Yes	Yes	0.18

Mullen & Williams	1991	Average growth in Gross State Product (GSP)	State	1969-1986	State and Local Taxes as % of GSP	No	Yes	Yes	-0.14
Beeson & Montgomery	1990	Employment Growth	MSA	1980-88	Effective business tax rate, sales and income tax rate	No	Yes	Yes	
Chihfeld	1990	%Change in MSA Output	MSA by Manufacturing Industry	1963-1977	State and MSA taxes as % of Income	Yes	Yes	Yes	-0.88
Luce	1990	Employment Growth	MSA for individual manufacturing industries	1972-1977, 1977-1982	ACIR tax effort index	Lagged Activity	Yes	Yes	-0.15
McConnell & Schwab	1990	New auto branch plants	County	1973-1982	Wheaton effective business tax rate for state, property tax rate for county	Existing activity, regional dummies	Yes	Yes	-1.4
Mehay & Solnick	1990	State employment	State	1976-1985	State and local taxes per $1000 of personal income	?	Yes	see notes	see notes
Mofidi & Stone	1990	Change in manufacturing employment and investment	State	1976-1972, 1972-1977, 1977-1982	Taxes as percentage of personal income	Yes	Yes	Yes	see notes
Munnell	1990	State employment growth rate	State	1970-1988	State and local taxes as a % of personal income	No	Yes	Yes	-0.66
Oh, et. al.	1990	Employment growth by industry	MSA	1977-1984	Wheaton corporate tax variable	No	Yes	No	?

Author	Year	Dependent variable	Geography	Time period	Tax variable		Index of state industrial development programs		Elasticity
Woodward	1990	Number of new Japanese branch plants	State	1980-1989	Effective corporate income tax rate, presence of unitary tax	Regional dummies	Index of state industrial development programs	No	-0.14
Bartik	1989	State small business start rate by industry	State	1976-1978, 1980-1982	Effective business rates for many taxes	Yes	Yes	Yes	-0.73
Bauer & Cromwell	1989	Number of new firm births divided by existing employment	MSA	1980-1982	Effective state corporate tax rate	No	No	Yes	-0.61
Carroll & Wasylenko	1989	% change in employment by industry	State	1981-1987	State and local taxes as percentage of income	No	Yes	Yes	-.39 for total employment, -1.25 for manufacturing
Crihfield	1989	% change in aggregate MSA labor demand	MSA	1963-1977	State and MSA taxes per $ of income, effective county property tax rate	Yes	Yes	Yes	-0.77
Diech	1989	Number of small business starts and branch plant starts			Effective corporate income tax rate, property tax rate	No	Yes	Yes	.13 for small business, .02 for branch plants (Avg.=.07)
Duffy-Deno & Eberts	1989	Per capita personal income level	MSA	1980-1984	State and Local revenue divided by state and local tax capacity (from ACIR)	No	Yes	Yes	-0.27
Freidman, et.al.	1989	Number of foreign manufacturing branch plant openings	State	1977-1986	Effective corporate income and property tax rates	No	No	No	n/a

Papke	1989a	State GSP in 4 industries	State	1975-1982	Effective tax rate from AFTAX model	Yes	No	No	-.74 for apparel, -.19 for furniture and fixtures, .13 for printing and publishing, -.32 for electric and electronic equipment (weighted average using GSP as weights, is -.15)
Papke	(1989b, 1986)	Number of new plant births by state	State	1975-1982	Effective tax rate from AFTAX model	Yes	Yes	Yes	-.49 for communication equipment, -.13 for furniture, -.05 for apparel, .08 for publishing, .23 for electronic components (Avg.=-.07)
Testa	1989	% change in total manufacturing and nonmanufacturing employment		1976-1985, 1976-1982	% change in per capita state and local taxes	No?	Yes?	Yes	-.35 for total employment, -.93 for manufacturing, -.02 for nonmanufacturing, .04 for manufacturing output (-.35 used in avg. calc.)
Wasylenko	1988	% change in employment by industry	State	1980-1985	State taxes as percentage of income	No	Yes	Yes	-.13 for total employment, -.90 for mfg.
Canto & Webb	1987	Annual % change in state per capita personal income	State	1957-1977	% change in state and local tax burden per $1000 of personal income	Yes	No	Yes	Average -.35 over all 48 states
Doeringer, et.al.	1987	Percentage growth in state employment	State	1970-1980	Nominal corporate tax rate	No	No	No	-0.16

Place	1986	Annual sate employment growth	State	1972-1984	state revenue per capita	No	Yes	No		Units unclear; sign varies across specifications; usually insignificant (avg.=0)
Wheat	1986	Percentage growth in state manufacturing employment	State	1963-1977	Total corporate income taxes divided by manufacturing value-added	No	No	No		Wrong sign, magnitude unreported (avg.=0)
Bartik	1985	Number of new Fortune 500 branch plants choosing the state	State	1972-1978	Effective corporate tax rate, property tax rate, UI tax rate, workers compensation tax rate	Regional dummies, existing activity	Yes	Yes		-0.45
Helms	1985	State personal income	State	1965-1979	Property tax, other taxes as % of personal income	Yes	Yes	Yes		-0.39
Luger & Shetty	1985	Number of new foreign plant start-ups in 3 industries (drugs, machinery, motor vehicles)		1981-1983	Weighted average of Wheaton business tax measure and personal tax rate	existing business activity	No	Yes		n/a
Summers & Luce	1985	Metropolitan employment growth rate by industry	MSA	1967-1977, 1977-1983	MSA tax effort index from ACIR	No	No	Yes		-.10 for 1967-1977, .05 for 1977-1983 (avg.=-.03)
Wasylenko & McGuire	1985	% growth in total state employment, and by major industry	State	1973-1980	Tax effort, effective corporate and personal income taxes	Existing business activity	Yes	Yes		-.85 for total employment, -1.54 for manufacturing employment
Armington, et.al.	1984	Number of business formations per 1000 workers and	MSA	1976-1980	ACIR tax capacity index	No	No	Yes		Formation rate/employment growth results for high tech: -.25/-

		employment growth in MSAs,							.89; for other mfg.; -50/-.22for small firm high-tech: -.34/.38: for large firm high tech: -.10/-1.05; small firm low-tech: -.52/-.26; large firm low-tech: -.40/-.16 (avg. mfg. employment growth result =-.55
Gyourko	1984	New manufacturing capital investment per dollar of value added	City	1969-1978	Nominal state corporate tax rate, nominal local corporate tax rate, local income tax rate, effective property tax rate	Regional dummies	Yes	Marginally significant	n/a
Steinnes	1984	State employment change in manufacturing, two year intervals	State	1973-1975, 1977-1979	Average tax bills form hypothetical firms	Yes	No	Yes	n/a
Yandle	1984	% change in real value added in manufacturing	State	1963-1967, 1967-1972, 1972-1977	Total state and local taxes per $1000 of income	No	No	Marginally significant for 1963-1967	-0.03
Carlton	1983	Probability of new branch location and plant size in various MSAs for various industries	MSA	1967-1971	Effective property tax rate, average of corporate and personal income tax rate	No	No	No	.17 for plastics, zero for other industries (.06 used as average)

Garofalo & Malhotra	1983	Responsiveness of long-run optimal state manufacturing capital stock, based on estimated cost functions	State		Cost of capital term incorporates property tax rates and state corporate tax rates	No	No	Yes?	-0.02
Newman	1983	Relative percentage growth in employment by state, for 2-didgit manufacturing industries	State	1957-1965, 1965-1973	Maximum marginal corporate rate, lagged 10 years	Yes	No	Yes	-.26 more negative for more capital intensive industries but not significantly so
Plaut & Pluta	1983	% change in state manufacturing value added, employment and capital	State	1967-1972, 1972-1977	Business climate index, tax effort index, corporate income tax, sales tax, property tax, personal income tax	No	Yes	Yes	n/a
Bradbury, et.al.	1982	MSA employment change	MSA	1960-1970, 1970-1975	MSA local taxes per capita	No	?	Yes	-.13 for 1960-1970, dropped from 1970-1975 (-.07 used as average)
Hodge	1981	Gross investment rate in 4 industries	MSA	1963-1975	Effective property tax rate, nominal corporate tax rate	Regional dummies, existing business activity	No	Yes	-.60 for furniture, .54 for plastics and rubber, -.65 for apparel, .24 for electronics (-.15 used as avg.)
Kieschnick	1981 or 1983	State share of investment for 13 manufacturing industries	State	1977	State and local taxes paid by hypothetical corporation	Existing activity	No	Yes	n/a

Vedder	1981	State per capita income growth	State	1970-1979	Change in state and local taxes as a % of personal income	?	No	Yes	n/a
Browne, et.al.	1980	Net per capita investment in manufacturing	State	1959-1976	Personal taxes as a % of personal income	No	No	No	report weak negative relationship but not actual coefficient (assumed avg. =0)
Dye	1980	employment, income, and manufacturing value added		1972-1976	income tax rate; income tax as % of income; sales tax as % of income	No	Yes	?	n/a
Carlton	1979	Number of new single establishment plants, and number of new branch plants	MSA	1967-1971, 1972-1975	Effective property tax rate; weighted average of corporate and personal tax rates	Existing activity	No	No	Births/branch results for plastics: -.02/-.70; for communication equipment: .33/-.82; for electronic components: .25/.13 (avg. =-.14)
Romans & Subrahmanyam	1979	% change in income, % change in employment	State	1964-1974	ACIR measures of business tax effort, personal tax effort; average marginal personal income tax rate	regional growth	No	Yes	.27 for income, .04 for employment (.04 used in avg. calc.)

Table IV.A.2: A Summary of Intra-State and Intra-Metropolitan Studies on Taxes and Business Location

Authors	Year	Business Activity Measure	Level of Aggregation/Unit of Observation	Time Period	Tax Measure	Fixed Effect Controls	Public Service Controls	Significant Tax Effects	Results/Measures
Bollinger & Ihlanfeldt	2003	Employment Share for Atlanta MSA	Census Tract	1985-1997	Property tax, sales tax, statutory rates	Yes	Yes	No	
Mark, et. al	2000	Employment Growth	County & District of Columbia in Washington MSA	1969-1994	Personal Property, Real Estate, Income, Sales, Statutory Rates	Yes	Yes, Non-AFDC Spending, UI costs	Yes, Sales & Personal Property	-2.12 for personal property & -2.17 for sales tax
Palumbo, et.al.	1990	Overall city and overall suburban employment growth, analyzed separately	MSA	1970-1980	Per capita taxes, 1977	No	Yes	Marginally	.31 for city taxes, -.72 for suburban taxes
Inman	1987	Philadelphia share of national jobs, annual observations	City	1964-1983, 1969-1985	Philadelphia wage tax rate	No	No	Yes	-.15 in one specification, -.21 in other specification
Mills	1983	% growth in central city and overall suburban employment	MSA	1970-1980	State and local taxes per capita in 1970	No	No	No	n/a
Church	1981	Manufacturing capital expenditures per capita in 1967	City and Suburb	1967	Property tax rate	No	Yes	Yes	n/a
Grieson	1980	Philadelphia share of national jobs, annual observations	City	1965-1975	Distributed lag in Philadelphia wage tax rate	No	No	Yes	-.30 for all manufacturing and services, -.36 for manufacturing

Author	Year	Dependent variable	Geography	Time period	Tax variable				Result
Woodward	1990	Probability of Japanese plant choosing a county within a sate, given that it chose a state	County		Property taxes per capita	Existing activity	Only dummy for interstate highway and median years of schooling	No	-.09 and -.15 in all-county regressions
Sander	1989	% growth in Illinois county employment	County	1980-1986	Property taxes and other local taxes per capita	No	Yes	Yes	Elasticity of -.81
Glickman & Woodward	1987	Probability of foreign plant choosing a particular county within a sate, given that it chose the state	County	1979-1983	Property taxes per capita relative to state average	No	No	No	Elasticity of -.12
White	1986	% growth in manufacturing employment	County	1977-1981	Change in effective property tax rate	Yes	No	No	Elasticity of -1.85
Howland	1985	Number of new firms and new employment by county, within New Jersey, Maryland, Virginia, D.C., in machine tools and electronic components industry	County		Effective property tax rate, availability of property tax abatements	No	No	No	n/a

Table IV.A.3: A Summary of the Impacts of Economic Development Incentives on Business Location

Author	Year	Program Studied	Focus of Study	Findings
Bollinger & Ihlandfeldt	2003	EZ in Atlanta MSA	Examines how commercial and housing EZ affect the location of employment within Atlanta census tracks with employment measured as a share.	Designation as a Commercial EZ increases employment within a census tract from 83 – 176 jobs.
Faulk	2002	Georgia Job Tax Credit	Effect of Jobs Tax Credit on employment	Firms taking credit created 23-28% more jobs from 1993 to 1995, cost per job is $2280 to $2680.
Bondonio & Engberg	2000	EZ in 5 states	Employment growth by Zip Code	No significant impact of EZ on employment
Boarnet & Borgart	1996	EZ (New Jersey)	Municipal employment and property values	No impact of EZ on total employment or employment in specific sectors; no impact on property values
L. Papke	1994	EZ (Indiana)	Effects of EZ on inventories, machinery and equipment, and unemployment claims	EZ designation reduces personal property by 13%, reduces unemployment claims by 19%, & increases inventory by 8%.
Oh, et. al.	1990	EZ, Research parks	Determinants of MSA growth by industry	Enterprise zones and research parks had positive effects in many industries, although seldom significant
J. Papke	1990	EZ (Indiana)	Examining pre- and post-zone designation level of capital in zones, compared to a control set of Indiana townships	Enterprise zones had significantly less capital (7%) after designation than before, compared to control townships
Ambrosius	1989	State revenue bond financing, public works, accelerated depreciation, various tax breaks, enterprise zones, job training	Level or trend in state manufacturing value-added per capita or state unemployment rate changed after adoption of particular incentive	Genrally, insignificant effects, except tax break for land and capital improvments significantly associated with declining trend in unemployment rate
Coughlin, et.al.	1989	Sate expenditures to attract foreign direct investment	State spending affect on probability of being chosen for FDI	Large effect, ussaly significantly positive
Erickson & Freidman	1989	EZ	# of zone investments and jobs created as function of zone characteristics, zone incentives and MSA characteristics	Number of incentives often positivley associated with better zone performance, although not significant in all specifications; number of zones in state often negatively associated with zone performance, although not always significant

Rubin & Wilder	1989	EZ (Evansville, Indiana)	Comparison of growth of enterprise zone industries with overall Evansville MSA	Enterprise zone gained significantly more jobs than MSA in warehousing, wholesale trade, retail trade, and services
Luger	1987	Financial/tax subsides, recruitment efforts, R&D support capital provision, state-funded job training	Effects on state wage and unemployment levels and changes	State job training reduces wages and reduces unemployment; other estimates very impercise
Jones, et.al.	1985	EZ	Comparison of zone employment growth before (1980-1982) and after (1982-1984) zone designation, using Dun and Bradstreet data	6 of 8 zones did better in after period
McHone	1984	Special tax and financial incentives	Comparison of growth rates of counties in different states but same MSA	MSA counties in states with property tax abatements, accelerated depreciation, or state-run development bond programs tended to grow faster than rest of MSA

V. State and Local Fiscal Policies and Property Value

Since the late 1960's with the publication of studies by authors such as Wallace Oates (1969), there have been numerous studies – far more than we intend to discuss or even document --of the determinants of property value with a particular interest in what impact state and local fiscal policies have on property values. While the majority of these studies have been empirical, numerous theoretical studies have examined how and why state and local fiscal policies, both taxes and expenditures, might affect property values.

While documenting the impact of fiscal policies, particularly property taxation, on property values is the primary objective of many of these studies, for many of these studies the impact of the fiscal policies on property values was viewed as evidence about broader issues. While not encompassing the objectives of all studies on property values and fiscal policies, we offer five general objectives typically pursued by studies of fiscal policy and capitalization:

1. Empirical studies focused on the extent of capitalization and the distribution of incidence between owners and consumers of housing;

2. Empirical studies that view the existence of capitalization of both taxes and public expenditures as evidence support of "Tiebout" residential mobility;

3. Empirical studies that view evidence of public expenditures or measures of the quality of public services positively affecting property values as evidence of the value of these services to residents.

4. Empirical studies that examine whether local public expenditures, generally primary and secondary education, are efficiently provided by evaluating the impacts of these services on property values.

5. Empirical studies that attempt to obtain demand curves for public expenditures or locational expenditures from estimates of their impacts on residential property values.

6. Theoretical studies that provide models and predictions of how fiscal policies might affect property values and the distributional impacts of fiscal policies, particularly property taxes.

Many of these objectives are found in single studies; for example, studies that examine the relationship between fiscal policies and property values as evidence of "Tiebout" mobility often examine this relationship for evidence of the stronger assertion of Tiebout that public goods and services provided by local governments should be provided efficiently. Here our primary interest will be on studies that provide empirical evidence on the relationship between property values on fiscal policies, both property taxes and public expenditures, with most of the attention being directed towards primary and secondary education. While we briefly discuss some of the theoretical literature on capitalization in a very general way, we will provide only summaries focused on the empirically testable predictions of these studies. We do not discuss here the more complex issue of attempting to obtain demand curves for public expenditures or amenities based on estimating the relationship between property

values and public services and locational amenities. We begin with a brief overview of the general empirical methodology

V.A   Estimating the Relationship between Property Values and State and Local Fiscal Policies

We begin our discussion by simply stating, in the form of an equation, the basic relationship that has traditionally been estimated, with modifications and extensions, since the seminal work of Oates.   The equation may be expressed as

$$PV_{ij} = \beta_0 + \beta_1 \tau_j + \beta_2 H_i + \beta_3 G_j + \beta_4 A_j + \varepsilon_{ij}$$

where PV_{ij} is the value of house i in community j; τ_j is the property tax rate in community j; H_i are characteristics of the house (square footage, number of rooms, bedrooms, bathrooms, lot size, etc.); G_j includes measures of public service expenditures or public service quality (for example, primary and secondary educational spending per student; educational test scores); A_j might refer to locational amenities; and ε_{ij} is the "error" in the equation representing random or determinants of property value that cannot be estimated or quantified. This equation is referred to in the literature as a "hedonic" equation. As we discuss later, this specification of the relationship between property values and property taxes is not technically correct and should be view as an approximation. Later we discuss the specification of the equation estimated in more recent studies on property tax capitalization.

Then the purpose of the statistical analysis is to estimate values for the coefficients (β's) in the equation. While the specification of the equation suggests using data on individual house values in a number of different jurisdictions (micro-data) generally obtained from the multiple listing service (MLS), the property value assessor

(PVA) or the American Housing Survey (AHS), many studies examine mean or median property value in a municipality, data readily obtainable from the Census of Population and Housing based on self-reported values. Generally in the equation estimated, the dependent variable is not property value but the natural logarithm of it *(LN(PV))*. The measure of the tax rate is also transformed to be the natural logarithm of the tax rate. There are two reasons for making these transformations. First, it appears that the logarithmic relationship is a better fit to the data and, second, it provides a nice interpretation – the coefficient on the natural logarithm of the tax rate provides an elasticity measure. Thus if we find the coefficient, β_1, equal to -.75, we can interpret this as evidence that a 10% increase in the rate of property taxation will reduce property values by 7.5%. This measure, when discussing property taxes, is referred to as the "capitalization" rate.   Full capitalization is a coefficient of -1 with "under-capitalization a rate between 0 and -1 and "over-capitalization a rate below -1.

V.B The Theory of Tax Capitalization and the Impacts of Local Fiscal Policies on Property Values

Wallace Oates in his early, seminal paper examining the relationship between the median house value, property tax rates and educational spending per student among other variables for northern New Jersey communities in 1960 found evidence that higher property taxes had a significant adverse (negative) impact on median house value and that increased educational spending had a significant positive impact when controlling for the characteristics of the housing stock in the community as well as community locational amenities (distance from New York CBD). He and others

following him interpreted the signs and significance of these coefficients as evidence in support of the "Tiebout" hypothesis. Why? From Oates (1969) a summary of the decision facing households when choosing a residence,

> In terms of the Tiebout model, we can conceive of a utility-maximizing consumer who weighs the benefits stemming from the program of local public services against the cost of his tax liability and chooses as a residence that locality which provides him with the greatest surplus of benefits over costs (Oates, 1969, p. 959).

Then Oates continues to devise a 'test' of whether, in fact, households appear to choose their community of residence following this cost-benefit approach,

> Moreover, this suggests a way to determine whether the Tiebout hypothesis of consumer location in accordance with preferences for local budgetary programs has any relevance to actual behavior. If consumers, in their choice of locality of residence, do consider the available program of public services, we would expect to find that, other things being equal (including tax rates), gross rents (actual or imputed) and therefore property values, would be higher in a community the more attractive its package of public goods. Individual families, desiring to consume higher levels of public output, would presumably tend to bid up property values in communities with high-quality programs of public services. (Oates, 1969, p. 959).

In a perfectly competitive private market for goods and services, the supply decision of a single firm will not affect the market price – any attempt by a firm in a competitive industry, with numerous competitors offering identical or nearly identical products to raise the price of its product above that of its competitors will result in the loss of all its sales. Analogously a competitive setting for communities would have many communities offering similar mixes and levels of public services with taxes set to finance these services. For these services as well as locational amenities and the characteristics of the property we can think of the price as being the property value

gross of taxes $V(1+\frac{\tau}{r})$ where r is the discount or interest rate making $\frac{\tau V}{r}$ the present

value of property tax payments.[5] Equivalently, the annualized gross rental cost is

$R+T = (r+\tau)V$ where R is the rent or annualized value and T is simply the tax payment,

τV. Although we make think of τ as the *statutory* property tax rate it is unlikely to be

the *effective* tax rate on the property. The distinction between the statutory and effective

rate of taxation is due to systematic differences between assessed and market values for

housing – the effective rate, the rate relevant to this discussion and typically used in

most studies, is equal to the product of the statutory rate and the ratio of assessed to

market value, the *equalization* rate.

Then, if households are mobile, as the Tiebout hypothesis assumes, and have a

large number of alternative communities with similar or, at the extreme, identical

services among which they can choose, then no community could increase the price of

its housing without increasing the quality of the amenities or services in the

community. This means that any increase in the tax rate without an increase in the

quality of public services must reduce the (net) value of housing *(V)* so that the gross

value $V(1+\frac{\tau}{r})$ remains unchanged. Then any increase in the present value of tax

payments should be offset by an equal reduction in the value of the house. This is

referred to as *full capitalization*.

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[5] This formulation assumes, as we discuss in more detail later, that the housing is an infinitely lived asset
making the present value of the infinite stream of costs simply annual cost (τV) divided by the discount
rate.

At the other extreme, if households were immobile among communities or did not have alternative communities in which they could reside and the assumptions of the Tiebout hypothesis are violated, increases in a community's tax rate would have no effect – there is zero capitalization. Costly or limited mobility or limited alternative communities would lead to incomplete capitalization – increases in the property tax would reduce property values keeping gross property values constant. In a series of papers, Hoyt (1991, 1992, 1993, 1999) models and considers the implications on capitalization when there is a limited number of alternative communities or what he refers to as imperfect competition. Then, in terms of estimating an equation in which the natural logarithm of property values *(LN(V))* is the dependent variable and the tax rate is also measured by *LN(τ)*, full capitalization gives a coefficient of -1; no capitalization gives a coefficient of 0 and incomplete capitalization gives a coefficient ranging from 0 to -1.

Oates arguments that the finding of capitalization of property taxes or public services as evidence of support of the Tiebout hypothesis have not been universally accepted among economists in this field. The model of communities and land that generated capitalization had several attributes critical to obtaining capitalization of public services and property taxes. The first attribute is that political jurisdictions were of a fixed land area and the economy was of a limited land area, all of which was residential use (in contrast to an agricultural fringe). The second attribute is that there is a single or at least finite number of distinct types of consumers, at least with respect to their demands for educational services.

Epple et.al. (1978) provide a formal model that illustrates the conditions under which no capitalization can be obtained consistent with the Hamilton (1975, 1976) and Edel and Sclar (1974) concept of long run equilibrium in a Tiebout model. The critical assumption of the model by Epple et. al., as well as the others finding no capitalization, is simply that there is a perfectly elastic supply of housing, that is, an elastic supply of both land and capital for housing. One interpretation of this is that the housing stock can respond quickly to changes in demands for housing and that housing at the fringe of a metropolitan area is a very good substitute for housing interior to the metropolitan area. This perfectly elastic supply of housing means that in equilibrium the price of a unit of housing, property value, is determined entirely by the costs of land and capital and must be independent of any other attributes of the community in which the housing is located, including quality of education or the provision of public services. Essentially, if any individual or group of individuals did not receive the mix of taxes, public services, and price of housing they desired (and satisfied budget constraints) they could move or create another community.

That all land and therefore, housing, regardless of location, would be valued equally is clearly not true. However, the proper interpretation of Epple et. al. and other researchers arguing the "no capitalization" viewpoint is that there should be no capitalization due to differences in mixes in public services or, in our case, educational quality or expenditures given that services are chosen by majority rule.

While empirical studies of capitalization received early criticism from the proponents of the "no capitalization" viewpoint, the overwhelming evidence of

capitalization of both taxes and measures of both educational inputs and outputs makes it hard to dismiss theories that argue for the existence of capitalization. One way to reconcile the two views is that differences in land and housing prices due to factors other than the level or quality of public services allows for inefficient public service provision in those areas in which there are high property values due to attractive amenities or proximity to employment. Also critical to the view that taxes and public services should affect property values would seem to be the need for some communities to inefficiently provide these services.

V.C   Empirical Evidence on the Extent and Existence of Property Tax Capitalization

Regardless of the theory that generates or does not generate a prediction of property tax capitalization, it is an empirical question as to the extent and existence of property tax capitalization.

While there are numerous differences and distinctions among studies of property taxes and property values, we can broadly categorize them based on the type of data used in the study and the type of tax capitalization they examine. Some studies, particularly early studies, used *aggregated data* in which the measure of property value is the mean or median house value in a municipality or some other geographical region. These data are generally from the Census of Population and Housing though some studies have also used data on equalized property values from state revenue cabinets. Alternatively, other studies, generally more recent, use *micro-data*, data on individual housing units generally from the Multiple Listing Service (MLS), the American Housing Survey (AHS), property value assessors (PVA) and sometimes data on individual

households (without geographic identifiers) from the Census of Population and Housing. The value of the housing is usually one of three measures: self-reported values (Census of Population and Housing, AHS), assessed values (PVA, equalized values) or market sales (MLS, PVA). Many users of the AHS for studies on the determinants of property value will only use data on households who, in addition to reporting their valuation of their own home, also report a recent sale; similarly, while the PVA may provide assessed values for all properties, most researchers prefer to use PVA data on actual sale values rather than assessed values.

In addition to distinctions in studies based on the type of data used, there are distinctions in the type of capitalization examined. Some studies examine *inter*jurisdictional capitalization of property taxes and public services – relating differences in property values among different communities to differences in the property taxes, amenities, and public services in these communities. Almost all studies using aggregated data are used to examine *inter*jurisdictional capitalization through micro-data, observations on individual houses across a number of communities usually within a single metropolitan area can also be used to examine *inter*jurisdictional capitalization as well. It is these studies that are most usefully in providing tests of the Tiebout hypothesis, specifically the extent to which households do base locational decisions on local taxes and public services and whether local public services appear to be efficiently provided.

Alternatively, other studies examine *intra*jurisdictional capitalization of property taxes, differences in the impacts of property taxes on property values within a single

community. These studies all use micro-data. While studies on *inter*jurisdictional

capitalization generally use equalized or effective property tax rates, for studies of

*intra*jurisdictional capitalization differences in property tax rates among households

cannot be due to different statutory rates, but are due to different *effective* rates of

property tax. These differences must be due to differences in the ratio of assessed to

market value within the community.

V.D   Complications to the Simple Model of Property Tax Capitalization

As mentioned, the log-linear specification discussed earlier is only an

approximation to the theoretical relationship between property values and property tax

rates. As discussed earlier, we can think of property value as reflecting the value of

household characteristics and amenities (h), public services (g), and amenities (a) with

q(h,g,a) being the rental value of this bundle of characteristics of the house and the

community in which it is located. Then following de Bartolome and Rosenthal (1999)

and Oates (1969) the value of a house is simply

$$v = \frac{(q(h,a,v) - \tau v)}{\sum_{t=1}^{T} (i - \pi)^t}$$

The value of the property will depend on its expected life (T), the nominal interest rate

and the inflation rate (π). The real interest rate is $r = i - \pi$. However, this formulation is

complicated even more by the fact that households that itemize get to deduct property

tax payments. Letting t represent the marginal income tax rate if the household

marginal investment is taxable, the relationship is given by

$$v = \frac{\left(q(h,a,v) - (1-t)\tau v\right)}{\sum\limits_{t=1}^{T}(i(1-t) - \pi)^t}$$

since the household only effectively pays (1-t) of it property taxes with t(τv) being

deducted. The interest rate is also adjusted to reflect the after-tax rate of return on an

alternative investment, *i(1-t)-π*. Thus, to precisely determine the impact of the property

tax on property values, de Bartolome and Rosenthal (1999), Do and Sirmans (1994) and

Palmon and Smith (1998) attempt to control for inflation and interest rates as well as

marginal income tax rates.

V.E   Evidence on Tax Capitalization

Yinger et. al. (1988) provides an excellent summary and review of studies

examining the capitalization of property taxes into property values prior to 1988 from

which we borrow heavily in our discussion and summary of the findings of this

literature. While Yinger et. al. (1988) categorizes studies according to whether they use

aggregate data or micro-data and examine the level of taxes or use micro-data and

examine the impact of tax changes, we classify studies according to whether they are

estimating *inter*jurisdictional capitalization or *intra*jurisdictional capitalization because,

as briefly discussed earlier, we believe there are reasons to think the impacts might be

different. However, for all practical purposes, this distinction is essentially the same as

that based on aggregate and micro-data based studies.

As just discussed, the rate of capitalization found in a study depends on prior

assumptions about the discount rate and the horizon (length of time) considered.

Studies generally use a discount rate of 3% to 8% and a time horizon of forty years to

infinite. Yinger et. al. calculate a capitalization rate for each of the studies they review using a discount rate of 3% and an infinite time horizon. As much as possible our discussion will focus on the capitalization rate based on this discount rate and time horizon. To put this capitalization rate in clearer perspective with a 3% discount rate and an infinite life, a $1.00 tax differential between two houses (with identical attributes otherwise) would lead to a difference in property value of $33.33 if there is full capitalization. A capitalization rate of 50% means that the $1.00 difference in taxes results in a $16.67 difference in price.

V.E.1 *Inter*jurisdictional Tax Capitalization

Table V.A.1 summarizes the findings of studies that examine *inter*jurisdictional tax capitalization, that is, studies that either have aggregate data on municipalities or census tracts or micro-data on more than a single municipality. As the table suggests, the estimated capitalization rate varies dramatically among studies from no capitalization to "over-capitalization", a rate of 127%. For studies using aggregated data, the median capitalization rate is 51% and the average is 53.5%. Studies using micro-data but estimating *inter*jurisdictional tax capitalization find a much lower rate of capitalization with estimates ranging from 0 to 31%, a much narrower range with a median rate of 26% and an average of 25%. It should be noted that for many of the studies using micro-data the nature of the study requires that the *inter*jurisdictional capitalization rate must equal the *intra*jurisdictional capitalization rate.

V.E.2 **Intra**jurisdictional Tax Capitalization

A problem frequently encountered in estimating these hedonic equations is the appropriate measure and control of differences in public services among communities. Failure to account or accurately measure these differences in public services makes the interpretation of the coefficients on the tax rate difficult. One approach to controlling for differences in public services is to only consider examining the relationship between property values and tax payments for houses within a single municipality in which there are no differences in public services or amenities.

Of course these differences in tax payments are of a different nature than differences in tax payments across jurisdictions. Differences in tax payments within a jurisdiction are not generally due to differences in tax rates but due to differences in how properties are assessed relative to their market value.

For micro-data based studies that estimate the same value for both *inter*jurisdictional and *intra*jurisdictional capitalization we find the median rate of capitalization to be 28.5% and the average to be about 44%.

For studies either examining capitalization in a single municipality or calculating a separate measure of *intra*jurisdictional capitalization when they have micro-data on houses in more than one jurisdiction, the median estimate for capitalization is 40% and the average is 38%. As seen in Table V.A.2, of the seventeen estimates coming from fourteen studies, three estimates are no capitalization with only one estimate exceeding 80% (Palmon and Smith (1998b). Estimates in ten of the twenty studies ranged between 40% and 66%.

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V.E.3 What can be said about Property Tax Capitalization?

The divergence in estimates of property tax capitalization, even when standardizing discount rates and the time horizon, makes it difficult to reach any strong conclusions about how property taxes affect property values. Most of the extremely low estimates of capitalization were from studies prior to 1980 as were the studies finding 100% or more for capitalization rates. Studies using microdata generally seem to have a narrower range of estimates even when estimating *inter*jurisdictional capitalization and while there is still a divergence in estimates, this range appears to have decreased in the more recent literature.

What can be concluded? While a few studies and researchers may disagree, it appears from the majority of the literature that capitalization of property taxes does occur but the evidence does not generally suggest full capitalization. Capitalization rates seem to vary among regions and even municipalities, and, as suggested by Edel and Sclar (1974), Linneman and Voith (1991), and de Bartolome and Rosenthal (1999) among houses and characteristics of the homeowners. Given these caveats, the vast majority of estimates seem to indicate capitalization rates for property taxes in the range of 40% to 65%.

V.F   Education and Property Values

As discussed earlier, in theory the market value of a home should reflect not only the characteristics of the home and, as just discussed, property taxes, but also the

quality of public services and other amenities in the area in which the house is located. While in theory this should apply for all public services and amenities valued by residents, in practice the focus of research has been on whether and how primary and secondary education influence property values with a lengthy literature developing on this topic.

Generally the focus of studies relating primary and secondary education to property values focuses on two distinct issues:

1) Is the level of expenditures on primary and secondary education efficient?

2) What aspects of education are valued by residents: inputs or outputs?

Then, consistent with this characterization of the objectives of studies examining the capitalization of educational services, we consider two ways of categorizing these studies. First, studies might be categorized by what their purpose is in examining the capitalization of educational services into property values. This method of categorization is not altogether unrelated to the second method of categorization, the measure of educational services used in the study. For some studies, the purpose, rather than the measure of educational services, is of interest; for others, primarily more recent studies, the focus of the study is often the measure of educational service used.

V.F.1 Capitalization and the Efficient Provision of Educational Services

As discussed earlier, Oates viewed his "test" of the Tiebout hypothesis as a test of whether taxes and public services influence location decisions. However, Oates offered an informal test of the stronger conjecture made by Tiebout (1956) that local public service provision with mobile residents should lead to efficient provision of these

services. Oates did this by considering the impact of a balanced-budget increase in educational spending on property values. By balanced-budget, Oates calculates the impact of raising the effective property tax rate from 2% to 3% on the median house value. He also determines how much additional revenue this will yield for education and what impact the additional revenue will have on educational spending per student. Then the impact of this increase in educational spending on property value plus the impact of the tax increase give the balanced budget increase. Oates finds that the two effects of a property tax increase roughly offset each other given his sample and the parameters of his regression model.

Jan Brueckner (1979, 1982) also addresses the issue of whether local public services, specifically educational services, are efficiently provided or not. Based on the idea that how much a government spends on education and its property tax rate are linked by the balanced budget condition, Brueckner (1979) asserts there is no need to include the tax rate in the hedonic equation and the empirical test of efficiency is whether the coefficient on educational expenditures is equal to zero in a regression in which aggregate property value is the dependent variable. Brueckner (1979) employs this framework to determine whether education (and other local public services) were efficiently provided using the same data as Oates did in his 1969 article. Brueckner finds that the coefficient on educational spending, while positive, is not significantly different from zero. As Brueckner notes, the coefficient on educational spending could be zero because some communities underprovide education while other communities overprovide education. Thus Brueckner argues this result might be interpreted as

evidence that these communities do not systematically under- or overprovide education.

In the past twenty years, a number of studies have adopted Brueckner's framework and methodology. These include Deller (1990a, 1990b), Taylor (1995), Bates and Santerre (2003) and Barrow and Rouse (2003). These studies generally suggest that the level of educational expenditures do not appear to be set systematically too low or too high if the objective of the municipality (school district) is to maximize property values.

V.F.2 What Aspects of Education are Capitalized: Inputs or Outputs?

In economics a voluminous literature has developed on the relationship between inputs in the production of education (student/teacher ratios, teacher education, expenditures) and measures of educational "outputs," typically scores on standardized tests, usually of reading or mathematics, given at a state level. Occasionally, graduation rates or earnings have been used as well.

While this extensive literature may have stimulated interest in how outputs, specifically student scores on standardized tests, influence property values, the first study that uses an output measure, Rosen and Fullerton (1977), actually precedes the best known literature on the relationship between educational inputs and outputs. Rosen and Fullerton argue that it should be the output or performance of the educational system that should influence property values, not expenditures, as presumably the quality of the school is what consumer/residents value. In their study, Rosen and Fullerton essentially try to follow Oates (1969), replacing educational

expenditures with one of several test scores (mean reading, math, and an average of the two for fourth grade students in the school district) in the hedonic equation. While Rosen and Fullerton found no relationship between property values and educational expenditures in their data when they replaced educational expenditures with either the math or reading score or the average of the two, there was a positive and significant relationship between property values and educational output. Based on their estimates, being in the highest rather than the lowest decile in reading scores would increase the median property value by $20,699 (in 2003 prices)!

Following Rosen and Fullerton, a number of studies have included educational test scores as explanatory variables with a summary of these studies and their findings found in *Table V.A.3*. These studies generally use individual housing sales data rather than aggregate or median property value in a community. Since these studies are not focused directly on whether education is efficiently provided, that is, whether property value in a community is maximized, use of individual housing sales affords more ob-servations and less aggregation bias. In all of these studies, test scores were found to have a positive and significant impact on property values, sometimes quantitatively quite large. For example, Jud (1985) is one of the few studies using aggregate property data and test scores, with the data coming from the 1980 census on towns and cities in the Los Angeles and San Francisco metropolitan area. Jud finds that that the average district test score for 3rd grade reading has a positive impact on median owner-occupied house value with a 4% increase in district test score associated with a 2% to 3% increase in property value.

A number of studies have included both measures of educational inputs, usually expenditures per pupil and educational output, test scores, as explanatory variables often with the explicit purpose of determining which measure seems to have more of an effect on property values. Downes and Zabel, (2002) examine the relationship between property values and schooling expenditures, minority enrollment and reading scores for the Chicago metropolitan area from 1987-1991. They emphasize three results from their study. First, that school-level attributes dominate district level attributes in the estimation. Second, that changes in spending seems to have no impact on changes in property values when changes in test scores are included in the regression. Finally, they find the percentage minority, both African-American and Hispanic, has a negative impact on property values.

A number of studies have examined the impact of the demographic composition of schools, specifically the percentage African-American or, less frequently, percentage Hispanic, on property values or, in a more dynamic setting, the impact of a change in minority composition on property value with this change associated with busing (integration) policies. The earliest study of this nature is Clotfelter (1975) which examines how the change in percentage minority in schools from 1960 to 1970 in Atlanta affected the median property value of predominately white census tracts associated with those schools. He found a negative and significant impact attributing a decrease in median house value of anywhere between 0% to 25% in some of the white census tracts. Gill (1983) examines the impacts of desegregation by comparing the capitalization rate from 1975 to 1979 of single family houses in suburbs of Columbus,

OH where there was no desegregation to the capitalization rate of single family houses in the city of Columbus in which a desegregation plan was pursued. Bogart and Cromwell (2000), while not explicitly measuring the impact of the racial mix of students on housing values, do consider the impact of redistricting primarily for the purposes of integration on housing values in Shaker Heights, a wealthy suburb of Cleveland, Ohio between 1983 and 1994, a period during which time boundaries of the schools were changed several times primarily for the purpose of integration. They find a significant negative impact of redistricting on property values, with the impact of this redistricting being reduced when the student has access to transportation. The impact of the percent of non-white students, while negative, was not statistically significant in any of the hedonic estimates.

V.F.3   How Does Education Affect Property Values?

The variety and ambiguity of educational measures makes it difficult to talk about a specific value for a capitalization rate as was done with property taxes. However, some conclusions appear to emerge from a review of this literature. First, both educational inputs, generally measured simply as expenditures, and education outputs such as scores on standardized tests affect property values with some of these effects being quantitatively quite large. Second, while for specific school districts increases or decreases in educational spending might increase property values in the district, there does not appear to be strong evidence suggesting that level of spending on primary and secondary education could be generally increased or reduced to increase property values. Finally, the composition of students in the school, specifically

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changes in the racial mix due to integration plans have had significant negative impacts

on property values in areas in which integration has occurred.

Table V.A.1 A Summary of Inter-Jurisdictional Tax Capitalization

Authors	Year	Unit of Observation	Location(s)	Time Period	Sample Size	Measure of Economic Activity (Dependent Variable)	Key Explanatory Variables	Estimated Tax Capitalization Rate (With 3% discount rate and infinite Horizon)	Assumed discount rate and time line	Summary/Implications Regarding Tax Capitalization
Oates	1969	Municipalities	New Jersey	1960	53	Median House Value	Log of effective tax rate, Log of school expenditures per pupil, Log of non-school expenditures per capita	61%	5%, 40 years	Full capitalization
Hienberg & Oates	1970	Municipality	Boston Area	1960	23	Median House Value	Log of effective tax rate, School expenditures per pupil	71%	5%, 40 years	100%
King	1973	House	New Haven Area	1967-1969	1892	House Sales Price	Actual tax payment minus predicted payment in low-tax town given current assessment, Student test scores, Perceived school quality from questionnaire, Perceived quality of other services, Public provision of water, sewage disposal, or garbage collection	18%	5%-8%, 40 years	30%-50%

Oates	1973	Municipality	New Jersey	1960	53	Median House Value	Log of effective tax rate, Log of school expenditures per pupil, Log of non-school expenditures per capita	61%	5%, 40 years	Full capitalization
Pollakowski	1973	Municipality	New Jersey & San Francisco Area	1960	53 & 19	Median House Value	Log of effective tax rate, Log of school expenditures per pupil	n/a	n/a	Capitalization estimates are sensitive to model specification.
Edel & Sclar	1974	Municipality	Boston Area	1930, 1940, 1950, 1960, 1970	In the range of 64-78 depending on year	Median House Value	Nominal tax rate (all years), Effective tax rate (1970), School expenditures per pupil, Highway expenditures per square mile	20% (1970)	8%, infinite	50% in 1970: Capitalization dissipates as long-run equilibrium is approached
Gustely	1976	Municipality	Syracuse Area	1970	100	Median House Value	Equalized school tax rate, Equalized non-school tax rate, Own-source school expenditures per pupil, Own-source non-school expenditures per capita	34%	8%, 40 years	≈ 65%
McDougal	1976	Census Tract	Los Angeles Area	1970	173	Median House Value	Equalized tax rate, 12th grade test score, Crime rate, Fire insurance index, Recreation index	62%	5%, infinite	complete capitalization
Meadows	1976	Municipality	New Jersey	1960, 1970	53 (1960) & 44 (1970)	Median House Value	Equalized tax rate, School expenditures per pupil, non-school expenditures per capita	127% (1960), 44% (1970)	n/a	Capitalization in 1960 and 1970

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Noto	1976	House	San Mateo Co, CA	1971-1973	17,000	House Sales Price Per Square Foot	Nominal tax rate interacted with percentage change in population and with percentage of units for sale	31%	11.4%, infinite	more than full
King	1977	Municipality	New Jersey	1960	53	Median House Value	Median tax payment, Log of school expenditures per pupil, Log of non-school expenditures per capita	36%	5%, 40 years	67%
Rosen & Fullerton	1977	Municipality	New Jersey	1960, 1970	53	Median House Value	Log of effective tax rate, 4th grade test scores	58%	6%, 40 years	88%
Chinloy	1978	House	London, Ontario	1974	1224	Owner Estimate of Market Value	Effective tax rate minus rate of income tax credit	0%	5%, 40 years	
Gronberg	1979	Municipality	Chicago Area	1970	83	Median House Value	Nominal municipal tax rate, Nominal school tax rate, Municipal expenditures per capita, School expenditures per pupil	0%	n/a	no capitalization
Dusansky, et. al.	1981	School District	Suffolk County, NY	1970	62	Median House Value	Equalized tax rate, School expenditures per pupil,	22%	5%, 10-40 years	43%-96%, depending on time horizon
Gabriel	1981	Municipality	San Francisco Area	1978-1979	30	Change in Mean House Value	Change in Mean Tax Payment	36%	n/a	Cap. Ratio = 12

Ihlanfeldt &Jackson	1982	City	St. Louis, MO.	1976	1321	Owner Estimate of Market Value	Systematic assessment error, Random assessment error	66%	real rate, 40 years	Cap. Ratio of 22 for systematic assessment errors. Larger but insignificant ratio for random assessment errors.
Lea	1982	House	U.S.	1968	680	Owner Estimate of Market Value	Average effective tax rate in county, Average expenditure per capita in county	26%	n/a	Taxes capitalized to a lesser extent than services
Rosen	1982	Municipality	San Francisco Area	1978-1979	64	Change in Mean House Value	Change in Mean Tax Payment	22%	n/a	Cap Ratio = 7.3

Table V.A.2 A Summary of Inter-Jurisdictional Tax Capitalization

Authors	Year	Unit of Observation	Location(s)	Time Period	Sample Size	Measure of Economic Activity (Dependent Variable)	Key Explanatory Variables	Estimated Tax Capitalization Rate (With 3% discount rate and infinite Horizon)	Summary/Implications Regarding Tax Capitalization
Wicks, et. al.	1976	House	Missoula, Montana	1965	64	Observed Minus Predicted Sales Price	Change in tax payment	50%	Cap. Ratio = 17
Smith	1970	House	San Francisco Area	1966-1968	301	Observed Minus Predicted Sales Price	Change in tax payment, Proximity to revaluation	44%	Cap. Ratio = 14.5. Tax changes from revaluation are anticipated.
Church	1974	House	Martinez, CA	1967-1970	957	Log of House Sale Price	Log of (discount rate plus effective tax rate)	n/a	over capitalization

Edelstien	1974	House	Philadelphia Area	1967-1969	2143	House Sales Price	Property tax payment per bedroom, # dummy variables for groups of communities	23% and 47% for 4 and 2 bedroom homes respectively	Cap. Ratio = 7.75 for 4 bedroom: Cap. Ratio = 15.5 for 2 bedroom
Moody	1974	House	San Francisco Area	1963	518	Deviation of Sales Price from pre-1963 trend in the Jurisdiction	Dummy variable for location in the jurisdiction with a transit tax increase, Access to new transit station	≈ 60%	Cap. Ratio = 18-22
Wales & Weins	1974	House	Surrey, British Columbia	1970	1828	House Sales Price	Effective tax rate	n/a	no capitalization
Case	1978	House	Boston Area & Hanford, CA	1971 and 1972-1975	2195 & 1014	House Sales Price	Effective tax rate, Actual and predicted assessed value, School expenditures per pupil, Sewer tie in, Paved road	Interjurisdictional: 26% Intrajurisdictional: 50% & zero	Interjurisdictional cap. Ratio = 8.8: Intrajurisdictional cap. Ratio = 16.6 (insignificant in one case)

Hamilton	1979	House	Toronto Area	1961	410	House Sales Price	Community fiscal surplus (expenditures minus tax payments), Education spending per pupil	Intrajurisdictional: 50% Interjurisdictional: 28%	Intrajurisdictional cap. Ratio = 16.8: Interjurisdictional cap. Ratio = 9.37 (based on fiscal surplus
Reinhard	1981	Municipality	San Mateo Co, CA	1969-1970	53	House Value	Effective tax rate, School expenditures per pupil, Nonschool expenditures per capita	107%	100%
Richardson & Thalheimer	1981	House	Fayette Co. Lexington, KY	1973-1974	861	Log of House Value	Dummy variable for location in the city, Sanitary sewers	15%	73%
Goodman	1983	House	New Haven Area	1967-1969	1835	Box-Cox Transformation of Sales Price	Effective tax rate, Average house price in the jurisdiction	Intrajurisdictional ≈ 65% Interjurisdictional ≈ 25%	Intrajurisdictional: 10-122% (based on fiscal surplus)
Palmon & Smith	1998	House	Houston 1981		501	Log (Sale Price)	Municipal Utility District Tax Rates	62%	
Palmon & Smith	1998	House	Houston 1981		501	Log (Sale Price)	Municipal Utility District Tax Rates	55%	

de Bartolome & Rosenthal	1999	House	U.S.	1985/1989	566	Sale Price	Tax Payment	32% to 42%	

Table V.A.3 Education and Property Values

Author(s)	Year	Data	Unit of Observation	Dependent Variable	Measure of Educational Services	Results	Comments
Oates, W.E.	1969	1960 Census, Northern New Jersey townships and cities	Township	Median Value, Owner-Occupied Dwellings	Expenditures per pupil	2SLS gives capitalization of educational expenditures; balanced budget effect on property value of expenditure increase is approximately zero.	Seminal piece. Oates considers this evidence of capitalization (primarily of taxes) as evidence of "Tiebout" equilibrium.
Pollakowski, H.O.	1973	1960 Census, San Francisco-Oakland-San Jose townships and cities	Township	Median Value, Owner-Occupied Dwellings	Expenditures per pupil	Weak & unstable capitalization of educational expenditures	Comment on Oates (1969), criticizing instruments (2SLS) and specification of public services
Edel, M.; Sclar, E.	1974	1930-70 Census, Boston MSA townships	Township	Median Value, Owner-Occupied Dwellings	Expenditures per pupil	Capitalization rate for expenditures decreases from 1950 to 1970 as does tax capitalization	Argues that Oates (1969) is only short run equilibrium. Long run capitalization should disappear.
Grether, D. M.; Mieszkowski, P.	1974						
Clotfelter, C.M.	1975	1960-70 Census, Atlanta MSA	Census Tract	ΔMedian Value '60-'70, Owner-Occupied; ΔMedian gross rent, '60-'70	Δ% Minority (African-American) High School Enrollment	Δ% Minority is negative and significant on ΔMedian House Values in White Census Tracts; Median house values changed 0% to 25% as a result of desegregation plans	

Rosen, H.S.; Fullerton, D.J.	1977	1960-70 Census, Northern New Jersey	Township	Median Value, Owner-Occupied Dwellings	Expenditures per pupil, Test score (average 4th grade, reading and math)	Expenditures in 1970 perform poorly; test scores have positive & significant effect	Follows and replicates Oates (1969) argues inputs (expenditures) should not be used instead of outputs (achievement scores).
Brueckner, J.K.	1979	Same as Oates (1969), 53 municipalities in Northern New Jersey, 1960 from Census.	Municipality	Median Property Value, weighted for owner-occupied and all units	Educational Expenditures	Negative and significant coefficient on Educational Expenditures in 2SLS	Introduces the municipal budget constraint to eliminate the tax rate. Argues the negative sign of coefficient on educational expenditures in 2SLS results suggests that efficient result is indeterminant given that median property value is dependent variabl
Sonstelie, J.C.; Portney, P.R.	1980	San Mateo County, CA, 1969-1970 (1453 obs.)	Single Family Home	Gross of tax House Sale Price	Elementary expenditure per pupil; Reading Scores (3rd grade)	Finds positive & significant impact of both spending and test scores on gross rent.	Argues that gross value addresses the difficulties raised by Hamilton (1976) and others about long run versus short run Tiebout.
Jud, G.D.; Watts, J.M.	1981	Charlotte, NC 1977	Single Family Home	House Sale Price	Test Score (3rd reading grade average); % Minority	Test score is a significant, 1/2 grade level increases house value 675 ($77). Minority not significant with test scores included.	Uses hedonic to determine prices to estimate a demand for school quality.
Brueckner, J.K.	1982	54 Massachusetts communities, 1976.	Municipality (community)	Aggregate Property Value	Educational Expenditures (less capital outlays)	Positive but statistically insignificant coefficient on Education Expenditures	Again uses the budget constraint to eliminate tax rate. Argues that coefficient on educational expenditures not significantly different from zero means that efficient provision of education cannot be rejected for the sample.

Gill, H. L.	1983	MLS for Columbus, OH, 1975-1979 (5888 obs.)	Single Family Home	House Sale Price	Impact of desegregation: comparing changes in capitalization rates for suburbs (exempt from desegregation) to city (subject to it)	Finds large houses (4 or more bedrooms) in suburbs appreciated after desegregation required in city of Columbus.	
Vandell, K.D.; Zerbst, R. H.	1984	Dallas, TX, 1971-80	Single Family Home	House Sale Price	% minority in elementary school	Minority enrollment & desegregation adversely affect house values but small elasticities, .05 to .23	Uses ridge regression to reduce difficulties with multicollinearity. Examines impacts of desegregation over time by use of a panel.
Jud, G.D.	1985	1980 Census, Los Angeles and San Francisco Bay	Township or city	Median Value, Owner-Occupied Dwellings	District test score (3rd grade reading) & %Minority	Test score is a significant. 4% increase in district score associated with 2 to 3% increase in values. Minority not significant with test scores included.	Follows Rosen and Fullerton (1977) with test scores in Oates (1969) framework. Does not use 2SLS but addresses endogeneity following Ihanfeldt and Jackson (1982).
Deller, S.C.	1990	Illinois, 1982 (96 obs.)	County	Aggregate Property Value	Total Educational Expenditures	No evidence of overexpenditure on education	Argues that aggregation of jurisdictions to county eliminates difficulties with overlapping jurisdictions.
Deller, S.C.	1990	58 small towns (1,000-5,000) scattered throughout Maine (US), 1986	Community	Aggregate Property Value	Total Educational Expenditures	No evidence of overexpenditure on education	Follows Brueckner (1979, 1982, 1983) methodlogy. Argues that previous studies that draw on more than one labor market might be misspecified.
Walden, M.L.	1990	Raleigh, NC 1987	Single Family Home	House Sale Price	Standardized test score (CAT for elementary & middle) & SAT for high school; %minority	Capitalization of test scores rate is higher (more likely to be significant) for high school and middle school than elementary	Argues that lower capitalization rate for elementary is consistent with the more extensive use of magnet schools at elementary level

Taylor, L.L.	1995	1980 Census, Hartford, CT MSA	Community	Aggregate Property Value	Expenditures per pupil	No evidence of overexpenditure on education	Follows Brueckner (1979, 1982, 1983) methodlogy. Argues that previous studies that draw on more than one labor market might be misspecified.
Hayes, K.J.; Taylor, L.L.	1996	Dallas, TX 1987 with charactersitics of elementary schools	Single Family Home	House Sale Price	Expenditures per pupil; average math test scores for school, absolute and "school" effect	Spending has no impact on property values. Tests scores do but impact is due to "school" effect, controlling for demographics of students	An attempt to distinguish the contribution of the school to test results rather than simply use the raw test score.
Haurin, D.R.; Brasington, D.	1996	Ohio MSA's 1991 (9509 obs.)	Single Family Home	House Sale Price	Proportion of students passing all 4 sections of Ohio 9th grade proficiency test	Test measure is a significant. 2 s.dev. difference in test scores raises mean house value by 18%	
Bogart, W.T.; Cromwell, B.A.	1997	School Districts in Cleveland, OH, USA, 1976-1994	Owner-Occupied House	House Sale Price	District	Substantial difference in property values among neighboring school districts	Follows Oxaca (1973) methodology. Decomposes the difference in property values into explained (housing characteristics) and unexplained (school district) for houses.
Goodman, A.C; Thibodeau, T.G.	1998	Dallas, TX (US), 1995:1-1997:1 merged with data on elementary school zone	Single Family Home	House Sale Price	Elementary school zone	Technique for determining submarkets. Submarkets are defined by groups of elementary school zones. Here there are submarkets within a district.	A contrast to the maintained assumption in hedonic literature of a single continuous hedonic function.

Brasington, D.M.	1999	Ohio MSA's 1991 (9509 obs.)	Single Family Home	House Sale Price	Value-added: Δ% of proficient students between grades; Level: % of proficient students; Inputs: expenditures, student/teacher ratio, teacher salary & experience	Value-added measures not significant in hedonic; some of the levels of test scores and expenditures per pupil and teacher salary are significant and positive.	
Bogart, W.T.; Cromwell, B.A.	2000	Shaker Heights, OH (US), 1983-1994	Single Family Home	House Sale Price	Elementary only. Busing (available or not); %Nonwhite; Change in Schooling (neighborhood or not); 3rd grade test scores	Disrupting neighborhood school (busing to non-neighborhood) reduces house values by 9.9%. Adding transportation option (busing) adds 2.6% if to same school. Racial composition has insignificant impact.	Difference-in-Difference estimation before and after redistricting school catchment areas. Uses Oaxaca decomposition for before and after redistricting to decompose impact of district change.
Brasington, D.M.	2000			House Sale Price			
Weimer, D. L.; Wolkoff, M.J.	2001	Monroe County (Rochester, NY) 1997	Single Family Home	Single-family House Sale Price	Exam scores for elementary schools (English Language Arts); For high school: % reduced price lunch; graduation rate, suspension rate, advance placement rate	Positive impact of exam scores on property values even controlling for school demographics. Small increases in scores (1%) can lead to significant increases in property values (0.6 to 4.7%)	Uses the median value of homes in Census tract (or block) to control for neighborhood effects with IV estimation to address simultaneity issues.

Brunner, et. al.	2001	Voting results on voucher initiative in Los Angeles County, 1993.	Precinct	Percent voting in favor of the initiative	Education "premium" capitalized into housing	Significant negative coefficient on relationship between housing price premiums and voting returns	Argues that school district quality was a significant determinant of defeat of voucher proposition (174) in California. Consistent with expected reduction in property value in good districts as a result of a voucher.
Downes, T.A.; Zabe, J.E.	2002	American Housing Survey, Chicago, 1987-1991 merged with Illinois School-Report Cards	Single Family Home	Owner-estimated House value	Per-pupil district-level expenditures; %African American in school/district; %Hispanic in school/district; Reading scores	School-level attributes dominate district level for estimation. Spending has no effect on property value when test scores (8th grade reading) included. Negative impact of minorities on house values.	Uses 1st difference approach between 1987 and 1991 with dependent variable being difference in homeowner's perceived values. Instruments for district fiscal variables (tax rate and expenditures).
Barrow, L.; Rouse, C.E.	2003	Census of Governments, 1977, 1987	Independent School Districts	Aggregate Property Value	State Aid	IV/First Difference Results: Increases in State Aid increase Property Value	Follows Brueckner (1979, 1982, 1983) methodology of eliminating property tax through balanced budget condition
Bates, L.J.; Santerre, R.E.	2003	Connecticut communities,1994-95	Community	Aggregate Property Value	Total Educational Expenditures	Positive and significant coefficient on educational expenditures -- 10% increase in expenditures increases property values by 4.3%.	Follows Brueckner (1979, 1982, 1983) methodology. Focus is on minimum expenditure floors, arguing evidence does not suggest that in Conneticutt these have lead to overspending on education.
Gibbons, S.; Machin, S.	2003	UK, Government Land Registry; primary school performance from Department of Education and Employment, 1996-99	Single Family Home	House Sale Price	Primary School Performance (Key Stage 2, Level 4), proportion of children reaching target level at age 11.	Positive coefficient on performance measure -- 10% increase in performance leads to 6.9% increase in house prices.	Employs spatial econometric techniques to address the weaker link between residential location and school attendance in UK (than in US)

Brasington, D.M.	2003	Ohio MSA's 1991 (9509 obs.)	Single Family Home	House Sale Price	Proportion of students passing all 4 sections of Ohio 9th grade proficiency test	Estimates separate hedonics for 6 Ohio MSA's. Finds that proficiency measure has positive impact on house values -- 1% point increase in score raises value by $708. Estimates a supply elasticity of .14.	Calculates an implicit price for educational quality (test score) from a hedonic. Then in a 2SLS estimate uses implicit price to estimate a supply equation for educational quality -- how much area residents will increase quality with an increase in price

VI.   Global Impacts of Taxation

As discussed in Section III, the Tiebout hypothesis claimed that competition among communities with respect to the fiscal policies they choose can lead to efficiency in the provision of public services and taxes used to finance them. Tiebout argues that no explicit centralized government authority need regulate or restrict state and local government policies if there are sufficient choices among government providers and households and firms are mobile. Just as firms acting to maximize their own profits in private markets will, in competition, lead to efficiency, local governments acting in the interests of their residents should also lead to efficiency. Then explicitly in the literature on property values and fiscal policies and at least implicitly in the literature on the impact of fiscal policies and economic development is the idea that the policies that can maximize property values or employment within the region instituting the policies chosen by regions in the interests of their residents are social desirable.

In the past twenty years a literature has arisen that argues that communities acting in the interests of their own residents, even if in a competitive environment, may not, in fact, choose policies that are efficient. This literature is referred to as the literature on "tax competition" or more generally "fiscal competition".

As this literature is primarily theoretical and often quite technical, unlike our reviews of studies on taxes and employment in Section IV or fiscal policies and property values in Section V, here we focus primarily on the very general concepts and do not attempt to systematically review or summarize what is becoming a significant

number of papers on this topic.[6] In addition to providing a brief discussion of the general concepts, we summarize the results of numerical exercises that give some indication of the potential magnitude of the inefficiencies associated with tax competition. Finally, we briefly discuss some of the findings of a relatively small empirical literature on fiscal competition.

VI.A   Inefficiency with Tax Competition

While Oates (1972) is generally credited with the original idea that competition among local governments might lead to the inefficient underprovision of government services because of local governments competing to attract firms and capital to their locality, articles by John D. Wilson in 1986 and George Zodrow and Peter Mieszkowski, also in 1986, share credit for formalizing and demonstrating how this inefficiency might occur.

Within this literature, there are two distinct types of models to consider. One model focuses on competition for "industrial capital" with mobile capital (firms) and immobile residents. This may be thought of as characterizing tax competition among states or across metropolitan areas. Both the study by Wilson and that by Zodrow and Mieszkowski focus on this notion of tax competition.

In contrast are what might be considered models focusing on residential tax competition with both capital and households mobile within a metropolitan area. Studies by Epple and Zelenitz in 1981 and by Vernon Henderson in 1985 employ this

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[6] Wilson (1999) provides an excellent review of the literature up to that date.

framework as do several studies by William Hoyt (Hoyt (1991a, 1992, 1993, 1999)) in which the issue of inefficient provision is more formally analyzed.

Because the studies of competition for industrial capital are simpler to follow and probably more relevant to our discussion of the impact of taxes on employment we focus our discussion on the basic intuition provided by these models. However, because the models examining residential tax competition explicitly consider the impacts on real estate markets the findings of these studies merit at least some cursory discussion.

To simplify the analysis, most models of industrial tax competition assume a fixed amount of capital, or, to put it in a more applicable context, a fixed number of firms. This capital or these firms must choose to locate in one of many localities. Capital is the tax base in each of these localities meaning that expenditures on government services are simply the product of the (property) tax rate and the amount of capital in each locality.

Localities are assumed to choose their policies to maximize the utility of their residents which depends on both the income they receive as owners of resources, including labor, used by the firms and public services. Then the optimal tax policy for the locality is one in which the loss in utility from reduced income due to tax increases is exactly offset by the increase in utility from increased public services due to the tax increase.

When setting its tax policy, the local government considers how tax increases affect the amount of capital in the locality for two reasons. First, as just mentioned,

reductions in capital in the locality mean a reduction in profits; second, the greater the

reduction in capital due to an increase in the tax rate, the greater the reduction in the tax

base and the smaller the increase in public services.

While the reduction in the tax base to the locality raising its tax on capital may be

a loss to its residents, this capital will relocate in some other locality leading to an

increase in tax base, public services, and, therefore resident utility there. These gains to

other localities are known as "fiscal externalities" and as with private goods with

externalities, competitive markets will not, in general, be efficient. Essentially the

locality considering the tax increase ignores any benefits its action might have on

residents in other localities. Then, because these positive fiscal externalities are ignored,

taxes and public services are inefficiently low. As demonstrated by Hoyt (1991b), the

more competitive the environment, that is, the larger the number of localities, the

greater this underprovision and the inefficiency associated with it.

While most theoretical studies on this topic speak of taxing a generic capital,

clearly one the motivations for much of this research is the practice of states "bidding"

for large firms to locate plants in their state. Then the general implication of this

research is that this competitive bidding is a zero-sum game, that is, what is a gain to

one state, the successful bidding of the firm, is a loss to another state, the loss of the

firm. Of course, the firm will benefit by receiving the tax concessions, but the states

may "bid away" any benefits they might have received from having the plant locate

there. Absence of bidding, or coordination between the states, could result in the firm

locating as it did with the competitive bidding but facing higher taxes and states being able to provide higher public services.

Two well-known studies suggest that this competitive bidding may, in fact, be efficient. Black and Hoyt (1989) argues that this form of bidding enables states to lower taxes on large enterprises to reflect the actual costs of providing them publicly-provided services and inputs so that the winning state will be the one that can most efficiently, that is, most cheaply, provide services to the firm. King et. al. (1993) makes a similar argument, suggesting that the amount a region might "bid" for a firm reflects the productivity in that region.

While most studies focus on underprovision of public services, there are cases in which public services might be overprovided due to competition for capital. As Keen and Marchand (1997) demonstrates, if governments provide both public inputs used in production as well as public services consumed by residents, public inputs will be overprovided as localities use these to attract firms from other localities and public services for residents will continue to be underprovided.

That competition for capital and firms by state and local governments may lead to the inefficient provision of public services suggests the possibility that intervention by a higher level of governments, states in the case local governments and federal governments in the case of states or provinces. One possible intervention or restriction that might be placed on local governments by state governments might be in the choice of tax instruments they can use. Tax competition arises because local governments employ property taxes, taxes that are in large part a tax on mobile business capital, to

finance public services consumed by residents, not businesses. Taxes directly placed on residents (income taxes) or on non-housing consumption that have little impact on housing consumption or business activity in that municipality or state will not lead to significant capital "flight" to other municipalities or states and therefore will not generate inefficiently low public service levels or tax rates.

While alternative tax policies such as income taxes borne by residents might be one remedy to the fiscal externalities generated by property taxes and other taxes on mobile capital, a more frequently suggested and analyzed policy has been the use of grants or subsidies from higher levels of government. David Wildasin in a 1989 paper formally demonstrates how a "matching" grant, from a higher level government would increase the level of public service provision from the lower levels of government by effectively lowering the price of public services. The intuition behind the efficacy of these grants to lower levels of governments is that the grant covers the fiscal externality, the gain in tax base to other regions, which any region would naturally ignore when setting its tax rates.

VI.B   Tax Competition in Metropolitan Models

The results of studies that focus on competition for residential capital among municipalities generally obtain very similar results as those studies focusing on competition for industrial capital -- services to residents will be underprovided if they are financed by property taxes on residential land and capital. In contrast to the literature on industrial capital tax competition, in this literature the objective of the government is less obvious even if it is acting in the best interests of its constituencies.

As discussed in Section V, property value maximization will yield the efficient and desired policies for resident-homeowners for small municipalities. However, as William Hoyt demonstrates in a series of articles, in large municipalities, choosing policies that maximize property values will not necessarily maximize the welfare of resident-homeowners there. As Hoyt demonstrates, the reason that property value maximizing policies are not "utility-maximizing" policies in large municipalities is that in large municipalities there is incomplete capitalization of taxes and public services. Thus, for example, a ten percent increase in the property tax rate will not reduce property values by ten percent but by something less. This occurs because when large municipalities raise taxes, it causes significant migration of capital and residents from the municipality to other municipalities raising property values there. In addition to making the utility maximizing and property value maximizing policies different for large municipalities, incomplete capitalization will also make the policies of large and small municipalities different. If large municipalities choose policies to maximize property values, they should have lower tax rates than small municipalities; in contrast, if they choose policies to maximize the utility of resident-homeowners they will have higher tax rates and public service expenditures than small municipalities.

VI.C   The Costs of Tax Competition – How Large?

As mentioned, the literature on tax competition has primarily been theoretical in nature. The empirical work that has been done, to be discussed later, has focused on whether there is evidence of tax competition, that is, whether state or local governments fiscal policies are influenced by those of their neighbors. What has not been done

empirically is any attempt to determine the possible extent of the inefficiencies created by tax competition. Instead, a number of studies have "parameterized" the theoretical models, that is, provided numerical values for some of the variables related to factors that might affect the magnitude of tax competition including housing demand and production elasticities, the elasticity of demand for capital in production, and taste parameters for local public services. These studies then numerically solve, "simulate", the theoretical models to get an indication of the potential magnitude of the welfare costs associated with tax competition.

To understand the potential magnitude of the inefficiency, it is beneficial to contrast the rule that characterizes the efficient provision of any service, public or private, to the rule governments will use when taxing mobile capital. Efficient provision requires that the marginal benefit (MB), the benefit derived from the last unit consumed equal marginal cost (MC), the cost of the last unit. We can express this relationship as MB = MC. Following Wilson (1999), we can characterize the equation describing the provision of public services when financed by a tax on mobile capital as

$$MB = \frac{MC}{1 - \tau\varepsilon}$$

where τ is the property tax rate and ε is the elasticity of the tax base, that is the percentage change in the tax base (capital in the region) from a percentage change in the tax rate. Since ε is greater than zero the term $1 - \tau\varepsilon$ is less than one making $\frac{MC}{1 - \tau\varepsilon}$ greater than MC and therefore MB > MC – marginal benefit is greater than marginal cost which is inefficient. How much of a distortion between marginal benefit and marginal cost

depends on how mobile capital is (the more mobile, the greater the elasticity) and the tax rate. If the amount of capital in a region is unresponsive to changes in that region's tax rate, there will be little distortion between MB and MC; if capital is very mobile, the distortion could be quite large.

The impact of tax competition depends on what is being measured. Parry (2003) focuses on the welfare cost and argues that the loss is relatively small, less than 1% for of GDP for reasonable parameters. Wildasin (1989) suggests the impact is larger, but he focuses on the incremental cost of raising tax revenue when tax competition exists and not directly on the issue of centralized versus regional provision. To demonstrate more clearly the impacts of tax competition, we simulated a model similar to both those of Wildasin (1989) and Parry (2003). We provide relatively conservative values for the elasticity of demand for capital as well as the elasticity of demand for the public service. Unlike Wildasin (1989) and Parry (2003) but following Hoyt (1993), we also examine how the number of regions affects the extent of tax competition.

Table VI.1 provides the results of this simple exercise. The outcomes with a single region are, in this case, efficient with 10% of income being spent on the public service and real income at 140. Since the marginal cost of the public service is unity, marginal benefit in this case is unity as well. We can see that as soon as the number of jurisdictions increases to two, public service levels decrease to 7.55, a decrease of approximately 25% while marginal benefit for the public service increases by 25%. However, real income only decreases by .2% - the impact of tax competition is primarily in substitution from public services to private goods. As the table shows, increases in

the number of jurisdictions will continue to reduce public services and real incomes but not nearly as much as the reduction that occurs when the number of regions goes from one to two.

These simple simulations suggest that tax competition reduces local public service provision, providing some support for subsidies from higher levels of government or centralization of services. However, the very small reductions in real income due to these reductions in public services are extremely modest and should be weighed against other gains obtained from decentralization – more choice in public services and possibly some constraints on government behavior when it is not in the best interest of its constituents.

Table VI.1: Tax Competition and Welfare – Simulation Results

# of Jurisdictions	1	2	5	10	100	1000
Public Service	10	7.55	6.61	6.35	6.13	6.11
% Change in Public Service		-24.5	-33.9	-36.5	-38.7	-38.9
Real Income	140.0	139.7	139	139	139	139
% Change in Real Income		-0.20	-0.42	-0.49	-0.57	-0.57
Marginal Benefit	1.00	1.25	1.39	1.44	1.48	1.48

VI.D   Evidence of Tax Competition

While there is little evidence on the consequences of tax competition on the provision of public services or resident well-being, there is a relatively recent literature that attempts to find empirical evidence of the existence of tax competition by attempting to see how and whether governments of one state or locality respond to the policies of other states or localities.

Policy interdependence between regions does not necessarily mean that these governments are competing for resources as is the motivation of the tax competition literature. Alternative theories for this policy interdependence might be related to "spillovers" such as pollution or what is referred to as "yard-stick" competition in which governments use neighboring governments or governments of similar regions as a basis for their policy choices.[7]

Here we briefly discuss the results and general findings of a few studies that examine this interdependence in tax rates. Of the four published studies that examine this interdependence from a tax competition perspective, only one by Jan Brueckner and Luz A. Saavedra (2001) uses data from the United States. Since this is the only study using U.S. data and taking the tax-competition perspective, we shall focus our attention on it. Brueckner and Saavedra use data on 70 cities from the Boston metropolitan area for 1980 and 1990. They choose these two periods because of their interest in how Proposition 2½, a state property-tax limit, affected interactions between the municipalities. One issue in this literature is which municipalities should influence the taxes in a municipality – all others in the metropolitan area, only neighbors or a measure of influence based on proximity. Formally, a "weighting" matrix must be chosen which defines the expected influence of one municipality relative to another. Brueckner and Saavedra find, using a number of alternative weighting matrices, a positive relationship between a municipality's tax rate and their neighbors' rates. Then an increase in a neighboring municipality's tax rate should increase a neighbor's rate.

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[7] For a more detailed discussion of the different type of interactions between governments see Brueckner (2005).

These results hold both before and after Proposition 2½ though the impact is not as great after the passage of Proposition 2½ .

VII.   *Taxes, Economic Activity, and Property Values: How and Why does it Matter?*

In addition to debates among economists about how much of an impact taxes as well as other government policies have on economic development, particularly, employment, there is also a debate about the usefulness and interpretation of research on this topic. Further, some have argued that economists are providing politicians and policy-makers with the wrong information when it comes to making decisions. Here we briefly summarize a few viewpoints expressed in the literature and then offer some of our own thoughts.

VII.A   Not Just Jobs

The title of the1994 article by Paul Courant, "How Would You Know a Good Economic Development Policy if You Tripped over One? Hint. Don't Count Jobs" provides a pretty clear indication of his views on the value of studies examining the relationship between employment and economic development policies. Courant states that

> Put baldly, what I want to argue here is that, with a few notable exceptions, the existing literature reflects a great deal of effort that could have been better spent asking different questions. What we should seek to measure in our assessments of local economic development policies is changes in the level and distribution of economic welfare.[8]

The reason, Courant argues, that we need to measure something besides the impacts of taxes on employment or income is that

> The connection between welfare on the one hand and jobs, branch plants, investment, etc. on the other is by no means obvious or straightforward. What is straightforward are some standard propositions about the welfare economics of government intervention in the economy.[9]

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[8] Courant (1994), page 863.
[9] Ibid, p. 863.

Courant's claim is that while it may be the case that policies that increase employment may also increase economic welfare it is by no means evident that this is the case. He formalizes this claim in a proposition,

> If (1) the local economy exhibits the usual diminishing marginal returns to factors (technically, production sets are convex), if (2) existing taxes on mobile factors of production are levied on the benefit principle, if (3) there is no non-frictional unemployment, and if (4) the costs of local economic development policy are locally borne; any policy that subsidizes local business location must reduce economic welfare in the local economy.[10]

The "benefit" principle refers to the principle of having the tax paid by each party equal to the benefit they receive from the public services financed by the tax. Then if this condition is being met, any economic development program such as a tax incentive program or enterprise zone will be inefficient given that the other conditions are met as well. Of course, as Courant acknowledges, these conditions might not be met in which case the subsidies might be efficient. One obvious failure is when the mobile, taxed good (capital) might bear more costs than the benefits it receives. Black and Hoyt (1989) provide an example in which this might occur because of economics of scale in the production of public services. Alternatively, the basic model underlying the "tax competition" literature has taxes applied to mobile capital and benefits received by immobile residents, clearly a violation of the benefit principle. What is less compelling is to think that the benefit principle would be violated for human capital as well.

As an alternative to, or at least in addition to, the plethora (in his view) of studies on taxes and business location, Courant suggests a list of potentially productive research projects that we paraphrase

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[10] Ibid, p. 867.

- Undertake careful measures of the benefits to mobile factors and costs to local governments.

- Calculate, case by case, locally borne cost of development incentives.

- If distribution matters, study who gets job and incomes from interventions.

- Determine (jointly with psychologists) how much people are willing to pay for specific jobs.

- Figure out how to explain that in the long run, employment depends on labor supply and not on development policies.

VII.B Failure in Labor Markets

Not surprisingly, Timothy Bartik's view values studies on the labor impacts of economic development programs and the value of the programs themselves. In Bartik (1994), he argues that there are several "market failures" in the market for labor that may justify government intervention in the form of economic development programs. Bartik contends both in his 1994 article and in his discussion of Wasylenko (1997) (Bartik, 1997) that the benefits and costs of employment are not likely to be equal and job growth is "mispriced" and state and local governments may benefit from this job growth. He further contends that benefits of employment are more likely to exceed costs in areas with high unemployment or declining employment or population since excess capacity would enable reduced public service costs. Part of this market failure might, he argues, be attributed imperfect information in technology and practices of small firms that increase productivity. Bartik also suggests "geographic spillovers" of economic development. As discussed in *Section VI,* geographic spillovers of economic development policies of neighboring states or regions influence the level of economic development. Finally, Bartik argues that rather than have people come to jobs, that is, migrate to higher-employment

regions, it might make sense, given the disruptions and costliness of migration, to have employment come to the people.

While Courant had a list of research topics for academics, Bartik (1994) includes a "memo" to the Governor or Mayor of X in which he suggests: 1) targeting tax/financial subsidies for economic development to high unemployment areas and to jobs with high wage premiums; 2) economic development policies should emphasize business productivity by focusing on training programs and informational programs for small and medium sized firms; and 3) coordinate economic development programs within metropolitan areas and avoid intra-metropolitan competition.

VII.C   What Policymakers Want to Know and What They Should be Told

Harley Duncan at the time of his comments on Wasylenko (1997) was Executive Director of the Federation of Tax Administrators. His comments were focused on what he believed in these studies of taxes and business location policymakers might value and what else they would desire. Duncan argues that policymakers should be steered away by Wasylenko (and presumably others) from their attention to tax incentives and consider the broader and more general issues related to horizontal equity and tax neutrality. Further emphasis needs to be placed on how the general level of taxes affects employment rather than specific tax incentives.

With regard to what needs to be in this line of research to increase its relevance to policymakers, Duncan asserts that the finding that business taxes have less impact than general taxes on employment is surprising and merits further study. Similarly, Duncan feels that the inconclusive results from the literature on specific types of tax incentives such as enterprise zones require more research and more definitive results for it to be of value to policymakers.

While Harley Duncan may desire more studies estimating tax elasticities for economic activity, Theresa McGuire in her comments on Wasylenko (McGuire, 1997) expresses concerns about what economists engaged in performing these studies should actually advise policymakers. Her concerns appear, in part, related to skepticism about the believability of the results particularly for the long-run.

VII.D   Some Final Thoughts and Recommendations for Policy Makers

VII.D.1   Measuring the Economic Health of States and Local Governments

Courant (1994) essentially argues that studies examining the relationship between taxes and employment or other measures of economic activity are no substitute for studies that examine the costs and benefits of government taxes and services. While certainly not perfect substitutes, we believe that studies examining the impact of taxes on employment or income, like studies examining the relationship between taxes and property values discussed in *Section V* provide some evidence on the efficacy of government fiscal policies. In *Section V,* we discussed a strand of the literature on the impacts of fiscal policy on property values that focused on determining whether balanced-budget changes in taxes increased or decreased property values. This literature, most notably Brueckner (1979, 1982) and Sonstelie and Portney (1978) argued that if public services were efficiently provided then property values would be unaffected by a balanced-budget change.

One could make a less formal argument that the impact of balanced-budget changes in policies on employment, population, or income should provide some evidence about the desirability of a policy. If balanced-budget increase in taxes that increase education also increase employment, it would seem that the state has become more attractive and welfare of residents would have increased. With the exception of Harden and Hoyt (2002), which examines the im-

pacts of balanced-budget changes in the mix of taxes on employment growth, studies focus on the impacts of tax changes on employment without considering the implications for revenue and public services. Studies that consider and report balanced-budget tax elasticities would, we believe, give a better indication of the true impacts of changes in fiscal policies on economic activity.

VII.D.2   *Adding Geography to Tax Studies*

While we have learned from existing studies that economic activity is much more sensitive to differences in intra-state or intra-metropolitan taxes than interstate differences, the vast majority of studies use data either aggregated to the state level or in a single metropolitan area. While giving an indication of the "average" response to taxes, these studies are, at least implicitly, premised on the assumption of uniform responses throughout a state. Holmes (1998) finds very large responses to differences in business climate (right-to-work laws) for matched border counties. The findings of Hoyt and Harden (2005) suggests that there are differences in the impacts of state taxes on employment for areas near state borders and those that are not, and that failure to differentiate these two regions may reduce the estimated impact of taxes. More disaggregation and consideration of proximity to borders as well as the specific modeling of neighboring jurisdictions' taxes may yield both more precise estimates of tax elasticities and more useful information about the (geographical) distributional effects of taxes.

VII.D.3   *Improving Measures of Taxes*

Echoing some of the comments reported earlier, aggregating different types of taxes severely limits the usefulness for policymakers – will all taxes have the same impact? Which tax should be cut? While studies that disaggregate taxes by type but use average tax rates provide more useful information and are preferred by many researchers to statutory rates, more attention

to attempting to characterize the different tax brackets and the impacts of different marginal rates for different brackets might prove useful if difficult to do. Is it really the average personal income tax rate in the state that reduces employment or is that the tax structure is extremely progressive? Current studies cannot address this question.

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